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April 1909—Spraying Edition

BETTER FRUIT

PUBLISHED BY BETTER FRUIT PUBLISHING COMPANY, HOOD RIVER, OREGON

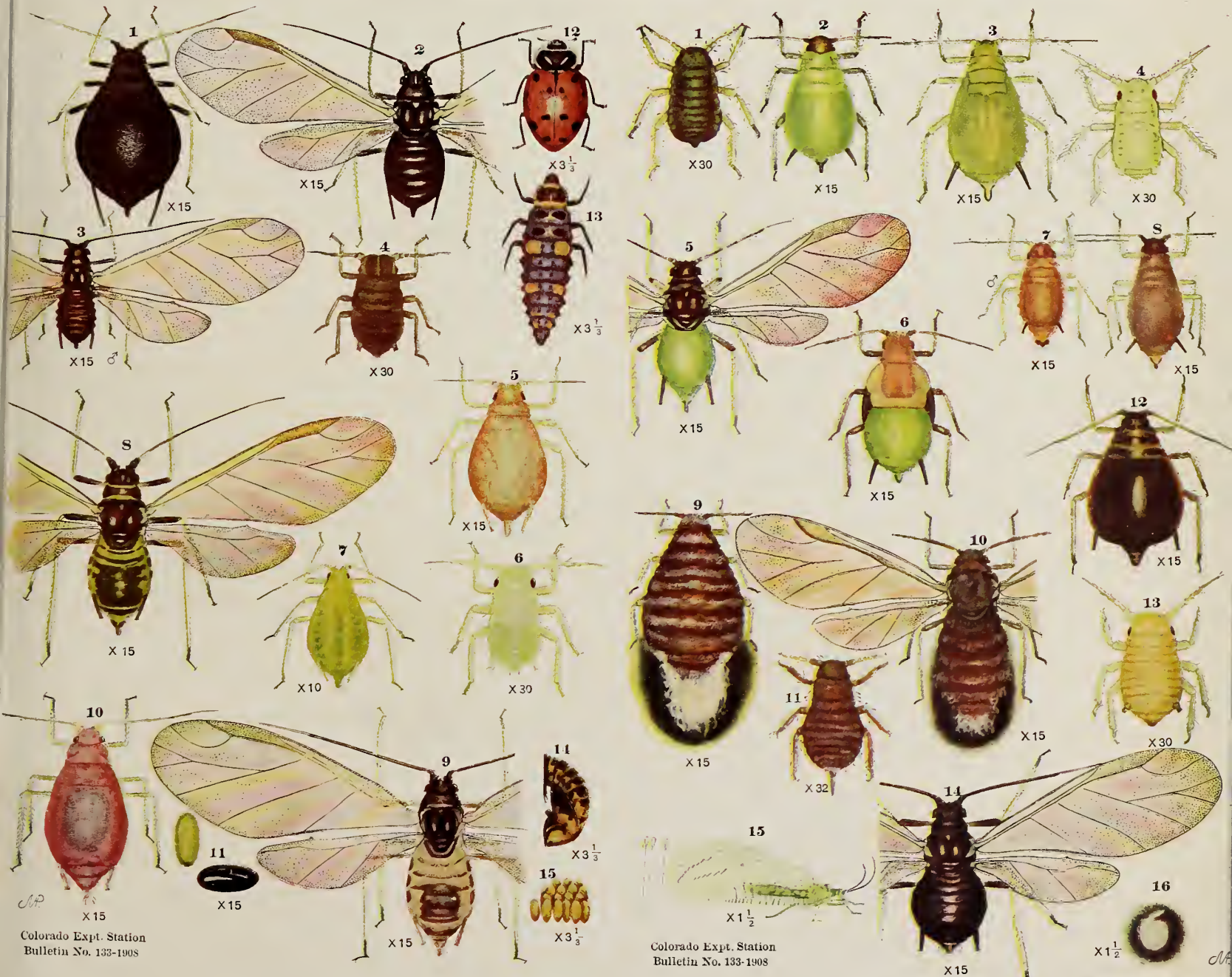


PLATE II PLANT LICE

PLATE II. Black Cherry Aphid, *Myzus cerasi*: 1, Apterous viviparous female; 2, alate viviparous female; 3, male. Green Peach Aphid, *Myzus persicae*: 4, Young stem mother, first instar; 5, adult stem mother; 6, young of stem mother; 7, apterous viviparous female of second generation; 8, spring migrant; 9, fall migrant; 10, egg-laying female; 11, eggs. Figures 12, 13, 14, 15, the adult, the larva, the pupa, and the eggs of the common lady beetle, *Hippodamia convergens*

PLATE I PLANT LICE

PLATE I. The Green Apple Aphid, *Aphis pomi*: 1, Young stem mother; 2, adult stem mother; 3, adult apterous viviparous female, second generation; 4, young female, second generation; 5, winged viviparous female of third generation; 6, pupa of preceding; 7 and 8, apterous male and female. The Woolly Apple Aphid, *Schizoneura lanigera*: 9, Apterous viviparous female; 10, fall migrant; 11, over-winter young. Black Peach Aphid, *Aphis persicae-niger*: 12, Adult apterous viviparous female; 13, young female, first instar; 14, alate female; 15, *Chrysopa* sp. and eggs; 16, cocoon of preceding

These Apples grew in the WHITE SALMON VALLEY



Opposite Hood River

Soil, climate & location especially adapted for high grade fruit & berries. Send for our *Book* descriptive of this beautiful valley

PARTLY IMPROVED

No. 181. Forty acres seven miles northeast of the town of White Salmon and five miles from the Columbia River. This tract has a very desirable slope and is first-class fruit land, having a deep, rich, red shot soil. Four acres are planted to Spitzenberg and Yellow Newtown trees one year old, with strawberries and other small fruits for family use. Eleven acres are cleared and ready for use, and also four acres in timothy and clover, with plenty of water for irrigation. Remainder of tract is the best orchard land. Small house and outbuildings. Has an abundance of pure spring water. The possibilities of this tract for a commercial orchard and for a home are hard to surpass. Write for prices and terms. This tract can be had at a bargain.

White Salmon Land Co.

VAN VORST & WELLS, Managers, Successors to J. C. McInnes

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Where is **ARCADIA** Located?

Twenty-two miles north of Spokane, on the Spokane Falls & Northern Railroad—
Where the soil is particularly adapted to growing winter apples.
Where there is an abundance of water from a gravity flow ditch.



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Where the shipping facilities are second to none in the entire Northwest.

Where you can remain in your present position while we grow a producing apple orchard for you and pay real estate taxes, etc.

Where you can buy tracts from two and a half acres up.

Where you can make the smallest cash-down terms and smallest monthly payments.

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Investigate this before buying elsewhere. If you are interested write for illustrated booklet, it costs nothing

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JONATHANS

NEWTOWNS

Prunes

Peaches

Pears

Plums

Apples

THE LAND OF OPPORTUNITY



A three-year-old Spitzenberg apple tree at White Salmon

Located across the Columbia River from Hood River, Oregon, the White Salmon Valley offers the greatest opportunities of any land on earth to fruit growers. Where apples, cherries, pears, peaches, prunes and strawberries grow to perfection. A few dollars invested in fruit land today will return to you in a very few years sixty-fold. The soil, climate, water and scenery are unsurpassed by that of any country. Build a home where you can enjoy peace and plenty the remainder of your life. Fruit lands cleared, planted and cared for until in a bearing condition. Write us for descriptive matter and prices.

Estes Realty & Investment Co.
WHITE SALMON, WASHINGTON

SPITZENBERGS

WINESAPS

Berries

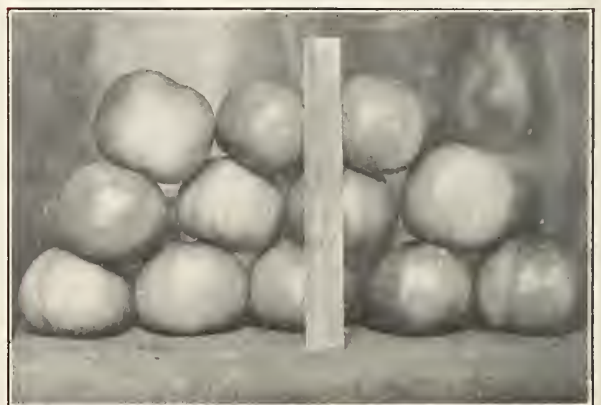
Cherries

Strawberries

Nuts

KLICKITAT

The land where the rain and the sunshine meet



KLICKITAT APPLES

Klickitat County is midway between the rainy coast region and the semi-arid interior. 1800 square miles of territory, extensive timber belt, fine fruit lands, rich grain sections, good grazing regions. Pure water, rich valleys, healthful climate. Long growing season, good transportation. **CHEAP LANDS**

For Booklet Address Department B

Klickitat Development League
GOLDENDALE, WASHINGTON

Niagara Lime-Sulphur Spray

Something About Cost. The most common formula for home making is as follows: Fifty pounds sulphur, fifty pounds lime, to 150 gallons water—then the trouble begins. The writers who fain would advise on the subject assume that the farmer by some magic or hocus pocus will get the entire quantity of materials into a perfect spray solution, for it is on that supposition only that he is able to support his argument in favor of the home made spray. Let us see. In the first place, he is cautioned to boil briskly so long, then to more briskly apply to the tree while all stirred up and hot. This is a very wise procedure, otherwise the dope would go solid and become useless. But supposing he tries to make a clear liquid solution which he can use in the same way as a commercial spray, he will have a resulting solid sediment equal to from one-half to two-thirds the entire charge. What does that mean? *Waste and loss*, with his labor and the mess thrown in for good measure; which, together with the resulting poor spraying, an inferior or lost crop is the result.

Now for Figures. One 50-gallon barrel of *Niagara* solution will make 600 gallons of spray, and can be bought for \$9.00. To make 600 gallons of spray by home formula (assuming that perchance good results are obtained) you must use:

200 pounds sulphur, costing, say, 2 cents per pound.....	\$4.00
200 pounds lime, costing, say, 1 cent per pound.....	2.00
Total for lime and sulphur only.....	\$6.00
That is just as far as practical figures go where labor and fuel do not count. But supposing labor does count.	
Can you hire a man to make up 600 gallons of spray for less than \$2.00? Then say.....	2.00
Even if fuel is of no direct cost, it still has a market value of, say, \$4.00 per cord. Will you not use one-eighth of a cord of wood.....	.50
Wear and tear and cost of repairs on vats, etc., we will make a guess of, say.....	.50
Total cost of 600 gallons home-made spray.....	\$9.00

The above figures are not a strained effort to show that *Niagara* and home made spray stand on equality as to cost and value. The comparison holds only in so far as the farmer works under the most favorable conditions and obtains the best possible results, such results as are obtained by the experiment stations in their work. The essential point is that the best results are the exception. The average fruit grower who is charged with making his own spray cannot be sure of getting a safe mixture, to say nothing of the best. The result is, inferior fruit or loss, with consequent discouragement.

Cheap Substitutes. Anybody can buy a sample of some good spray found on the market, send it to the chemist for analysis, and then he is ready for business; and of course sells below cost—just to get started.

Since *Niagara* has won a reputation over the whole Pacific Coast for reliability, there have sprung up like mushrooms a group of brimstone doctors, who, knowing nothing of the chemistry or methods of making a permanent lime-sulphur solution, by their wit and a few vinegar barrels go into the spray business. *Watch them.* If you get your dollar's worth, well and good. If you get a dope no better than you can make yourself for only a dollar or so more than it costs you—say nothing. But if you buy a cheap spray and because of ill results lose your crop—well, it might pay you to spend some time over figures. Here is one authenticated example:

Twenty-acre orchard, old methods, total crop sold for.....	\$ 20.00
Same orchard, up-to-date methods, using <i>Niagara</i> Spray, value of crop per acre, \$500.00.....	10,000.00
Difference to credit good methods.....	\$9,980.00

This may be exceptional, but is not exaggerated. In face of the value of the crop at stake, who will quibble over the price of a barrel of spray which he knows he can rely upon as against an unknown dope?

TESTIMONIALS: Many letters have been received, and still greater in number are the verbal expressions received from fruit growers from all parts of the Northwest, testifying to the merits of *Niagara Lime-Sulphur Spray*. Space will permit of only a few here.

HOOD RIVER—E. H. Shepard, Sears & Porter, William Kennedy, J. L. Carter, M. M. Hill and scores of others could be named who have been using *Niagara* with success. The prizes taken by some of these men, and prices, too, tell the story.

THE DALLES—The majority of the fruit growers here used *Niagara* last season. Result: The finest cherry display ever made.

YAKIMA VALLEY—Used last year by the Zillah Fruit Growers' Association and the Yakima Valley Fruit and Produce Growers' Association. Both of these unions have increased their orders threefold over past season. The Yakima Hardware Company, of North Yakima, writes: "We wish to say that *Niagara Spray* has given good satisfaction here this season."

WALLA WALLA—Here is where *Niagara* was submitted to the most exacting tests in orchard work. The Blalock Fruit Company writes, under date of September 2, 1908: "We had splendid success with *Niagara* here this season."

BRITISH COLUMBIA—W. J. Brandrith, manager British Columbia Fruit Growers' Association, writes: "*Niagara* has proved very effective."

ONTARIO, OREGON—Mr. Jenkins used fifty barrels on his one-hundred acre orchard. He was skeptical because of being disappointed in his experience the previous season with another brand of lime-sulphur solution. He reports *Niagara* as entirely satisfactory.

LEWISTON AND MERIDIAN, IDAHO; SPOKANE, WENATCHEE, STEVENS COUNTY, CLARKE COUNTY, and many other sections in Washington report favorably.

EUGENE—The Lane County Fruit Growers' Association are demonstrating what can be done in the Willamette Valley by intelligent effort and co-operation. The record made by this association is due in part to systematic spraying. They use *Niagara*.

CRESSWELL—Dr. L. D. Scarborough, having the largest orchard in this section, used *Niagara*, and is able to report the cleanest crop of apples had in years.

SALEM and many other parts of the Willamette Valley continue to use *Niagara* against unknown and cheaper articles, because the intelligent fruit grower will not risk his crop in an effort to save a few cents or a dollar on a barrel of spray.

MEDFORD has been using enough *Niagara Lime-Sulphur Spray* to warrant the erection of a plant there

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Medford Spray Factory

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W. J. BAKER & CO.
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First Premium State Fair 1907-08*

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County seat of Benton, in the heart of the famous Willamette Valley. Greatest dairy section of the West. Land unsurpassed for walnuts and fruit. Irrigation not required. Apples and peaches have better flavor and keep longer than those grown under irrigation. Extensive plantings of commercial orchards near Corvallis. The best farm lands cheaper than at any place in the valley; no inflated values. Corvallis has a population of 6,000; 200 new residences constructed since January 1, 1908. Oregon Agricultural College, the largest educational institution in the Northwest, 1,500 students, located here. Pure mountain water and all modern conveniences. No extremes in temperature. Opportunities here worth your while. For particulars write

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Principal City in the Yakima Valley

Centrally located in one of the finest fruit regions of the State. Excellent home town. Headquarters for sale of bearing orchards and thirty thousand acres orchard land under new government canal. For information address

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A Fruit Ranch in Washington

Is a paying investment

I have for sale one consisting of about 220 acres of YOUNG bearing apple trees of choice varieties. 180 acres in cultivation for grain and grasses. 60 acres in pasture, etc.

460 acres in all.

Soil is deep and rich. Running water piped to all farm buildings. At a shipping point. Telephone and daily mail.

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Land for Orchards

Land for Dairying

Land for Stock Raising

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The North Coast railway has a big crew building its grade through KENNEWICK. The Open River Association is building two new first-class steamboats to ply on the Columbia River from Celilo to KENNEWICK. *WHY?* Because strawberries are ripe the first week in May; bring \$10 a crate and are all shipped. Because alfalfa fields are cut four times each season, and furnish the first new hay. Because the markets of Montana, Idaho and the Coast want the first fruits and KENNEWICK produces them.

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CLIMATE—A desirable medium between the drier eastern and the more moist western conditions of the Northwest.

SOIL—Volcanic ash, rich in phosphates, and recognized as the best in the world for apples and strawberries.

Makes a specialty of real estate, conveying, loans and surveying. The president, John Leland Henderson, is a practicing lawyer residing in Hood River, and has been identified with the Hood River Valley for thirty years.

J. M. Schmeltzer, Secretary

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A new town, located sixty miles east of Portland, Oregon, on Columbia River, overlooking the famous Hood River Valley, Oregon. Here can be grown the small fruit, the big red apples, nuts and grasses, without irrigation. The ideal country for the man with small means. Transportation facilities are by rail and boat. Land values from \$40 to \$150 per acre. Information can be had by writing Secretary

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200 acres within 5 miles of railroad station, Both lake and river irrigation on the place. Land gently slopes to south and west. Unsurpassed for pears, peaches, Tokay grapes, has about 35 acres in apples now. Address

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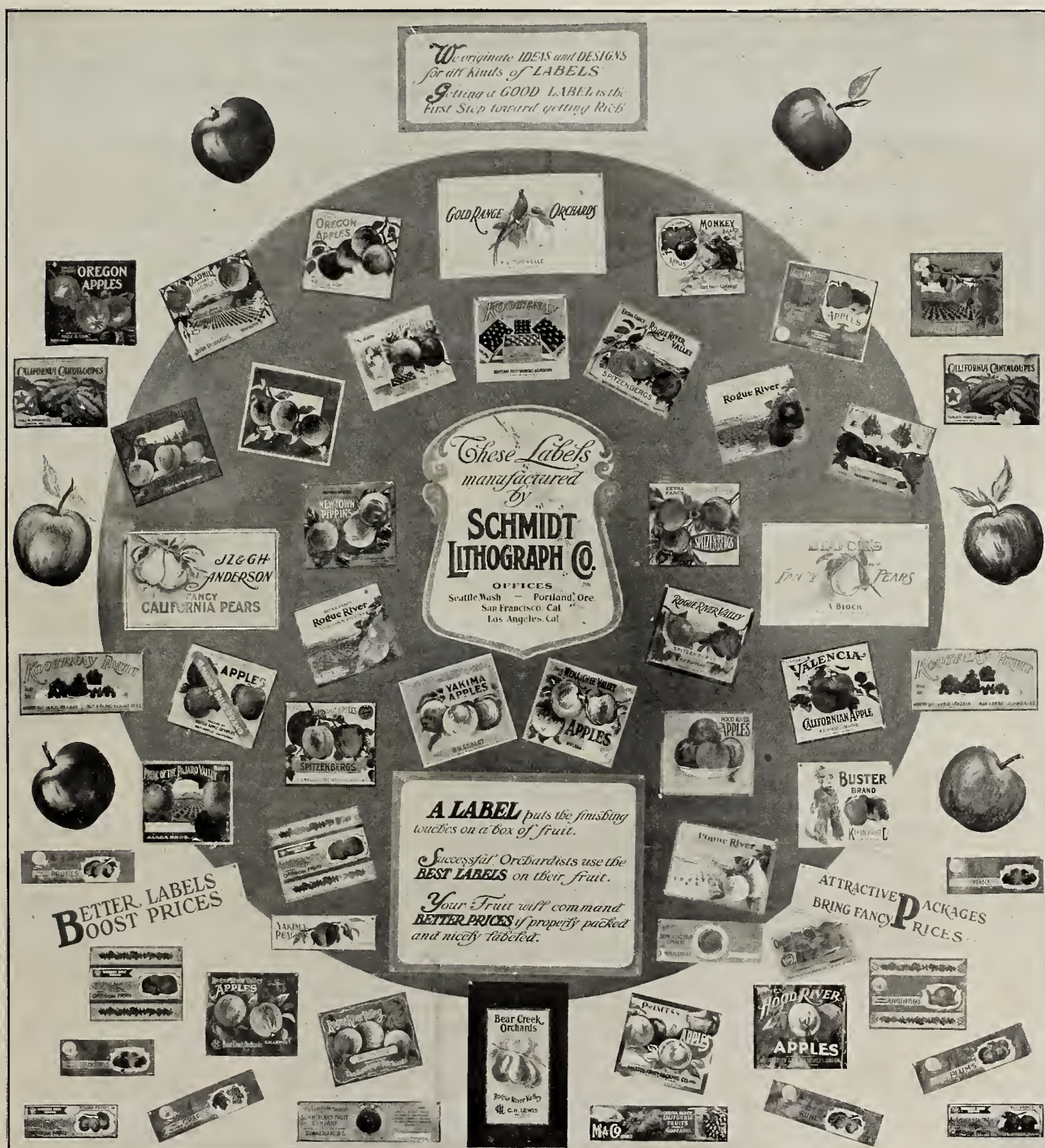
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White Salmon Valley Bargains

THIS Valley is located across the Columbia River from the Hood River Valley, and its land is equally as good for fruit as any in the Hood River Valley. **C**You will have to act quickly if you want any of them because land in this famous White Salmon Valley is rapidly increasing in value. We have sold many tracts of land in the last three years and those who bought from us are all well pleased. We can refer you to them. We also have bargains in city property and are daily listing other outside tracts which we will be glad to show you. *We guarantee every tract as good as represented.*

No. 167—4 acres close to town. Very rich fruit land and early strawberries. Unimproved, some slashed, and will make a nice home. Price, \$1,800. One-half cash, balance on terms.

No. 168—40 acres, five miles from White Salmon; most all cleared and practically level, rich, red shot soil. About 50 fruit trees set out and in bearing. One of the best improved tracts on our list. Price, \$3,000. Half cash, balance to suit.

No. 169—80 acres fine fruit land in the apple belt. About 30 acres cleared; some fruit trees. Practically level, rich soil. First class apple land. Price, \$4,000; terms.

No. 170—40 acres, six miles out; unimproved. Very easily cleared; rich deep soil. About one-half of this forty is fine apple land, the balance is too rough for cultivation, but is a snap at \$850. Only \$300 cash, balance to suit.

No. 171—70 acres, six miles out. Unimproved; 20 acres tillable, rest pasture land; can be easily cleared and has a running creek on one side of the land. Only \$1,100; \$500 cash, balance on time.

No. 172—39 acres, five miles out. Mostly unimproved, but has some clearing. All good fruit land, easy to clear. School and church on place. Price, for a short time, \$2,600; terms to suit.

No. 173—100 acres fine fruit land, four miles from White Salmon. Very rich soil and a nice, gently-rolling slope for apple orchard; has a small clearing on it with some fruit trees in bearing. Would divide into small tracts nicely. There is a good spring on the place and enough timber to pay for clearing it. Price, \$5,000; half cash.

No. 174—20 acres in the apple belt. About all level land; some two acres cleared on it, with small orchard in bearing; rest is covered with first class fir timber, good for lumber. Price, \$1,500; terms.

No. 175—80 acres, four miles out; 70 can be cultivated. All unimproved land; good for apples or any other fruit. A good buy at \$50 per acre; half cash.

No. 176—58½ acres, 4½ miles out, two miles from railroad station and boat landing. All good fruit land except 8 acres which is too steep to cultivate. Creek runs through the place; three good springs. 20 acres in cultivation; 4 acres in bearing orchard, 12 years old, mostly apples; 50 trees ready to set out. Good five-room house, barn and other out-buildings, all under fence and on county road. Price, \$5,000; terms.

No. 177—A very nice unimproved 40 acres in the apple belt, seven miles from town. All good land, covered with oak, fir and pine timber. One of the best tracts on our list and the price is right at \$2,500; terms. Look this up.

No. 178—200 acres in the White Salmon Valley, 3½ miles from Ilusum. Unimproved; close to White Salmon river; a good place to sell in small tracts or an investment. There is some fine fir and oak timber on place. Will make good apple orchards. Price only \$22 per acre.

No. 179—20 acres, three miles from town. Level land, rich soil, about 8 acres cleared; fine apple and strawberry land. Price, \$4,250 cash.

No. 180—20 acres, 3½ miles out; 4 acres cleared; good fruit land, rich red shot soil. Price, \$2,500; half cash.

No. 181—8 acres, close in. Rich soil, good for fruit or berries; directly under the proposed irrigating ditch; all level. Small bearing orchards; ¾ acre of strawberries; all under fence. Good level road from town. An ideal home at \$2,800, on good terms.

No. 182—10 acres, one-half mile out. Deep, rich soil; 7½ acres in high state of cultivation; gentle southwest slope, easily cultivated; very early fruit and berry land. The irrigating ditch will run on the north line, making very little expense to connect. Has 6 acres out to fruit trees from one to three years old; one acre to strawberries; balance of land easily cleared. Nicely sheltered and a magnificent view. Good new nine-room house just built; plenty of tools, such as plows, harrows, cultivators, etc. This can be made one of the best homes in White Salmon. Price, \$5,000; can be had on easy terms.

No. 183—160 acres timber claim, close to line of Yakima and Klickitat counties; very cheap; about 2,000,000 feet timber on it. Price, \$1,200 cash.

No. 184—320 acres, two miles from Gilmer, with about 90 acres cleared and good fruit land. Can be divided up nicely. Has some 5,000,000 feet fir timber on it and creek with several springs on land, two houses and other buildings. Price, \$8,500; \$5,000 cash, rest time to suit.

No. 185—6 acres in fruit home colony; about one acre cleared and very rich land; close to White Salmon River. Price, \$600 cash.

No. 186—160 acres at Gilmer. About 45 acres cleared; rich soil and road right through it; be fine place to tract at 40 acre tracts. Has several springs on it and creek through place. Good eight-room house, small barn. Price, \$5,000; \$3,000 cash, rest three and four years time.

No. 187—5 acres, close to town. Unimproved, nice level ground; has some rock on it. Would make a nice chicken and fruit farm. Price, \$650; \$150 cash, rest time.

No. 188—40 acres, unimproved; two miles from postoffice, in valley, with good fir timber on it; close to sawmill; good land. Price, \$1,250; half cash, rest to suit.

No. 189—40 acres, three miles from White Salmon River. Rich, red shot soil, with about 30 acres cleared; running water on place, good house and small barn; a few fruit trees set out. This place has about 8 acres of rich bottom land on it, for onions and vegetables. Price on this is only \$2,500; \$1,500 cash, rest time to suit.

No. 190—80 acres rich land, close to Gilmer. Fine red shot soil; good apple land. Has a creek running through it. 1,000,000 feet of fir timber. There is some 15 acres cleared on it; will make a fine general farm. Price, \$3,000; half cash, rest to suit.

No. 191—10 acres, all level land, unimproved. Early land; fine for strawberries; early sun. Will sell for \$750; \$500 cash, rest to suit.

No. 192—40 acres, unimproved, eight miles out. Good, red shot soil; apple land; about 25 acres is fine level land; 15 acres is rolling. Price, \$1,100; \$500 cash, rest terms.

No. 193—7 acres, close to town. Nice level land; about 5 acres cleared; some set out to fruit trees in bearing, and some strawberries. A good barn. Nice view can be had from this place. Road on two sides. Price, \$2,500; terms.

No. 194—5 acres fine fruit land, one-half mile from town; mostly all cleared. Is early strawberry land; has a nice slope to south. Small, three-room house and a good well of water. Will make a nice home close to town. Price, \$1,750; terms.

No. 195—10 acres, 1½ miles from White Salmon. Rich soil but is rolling; about 3 acres cleared, rest is all slashed and burned; easy to put ready. House and barn. Price, \$2,200; terms.

No. 196—160 acres, nine miles out. Unimproved, with some fine fir timber on it; some is rolling and some is level land; soil rich red shot. Only \$16 per acre; terms, half cash, rest two years.

No. 197—30 acres, three miles out; in the apple belt. 10 acres slashed and burned; very rich fruit land. Price, \$2,000; terms to suit.

No. 198—10 acres, one-half mile from town. About 8½ acres cleared, plowed; apples ready to set out; has a nice slope and keeps good moisture; good soil. Price, \$3,500; terms.

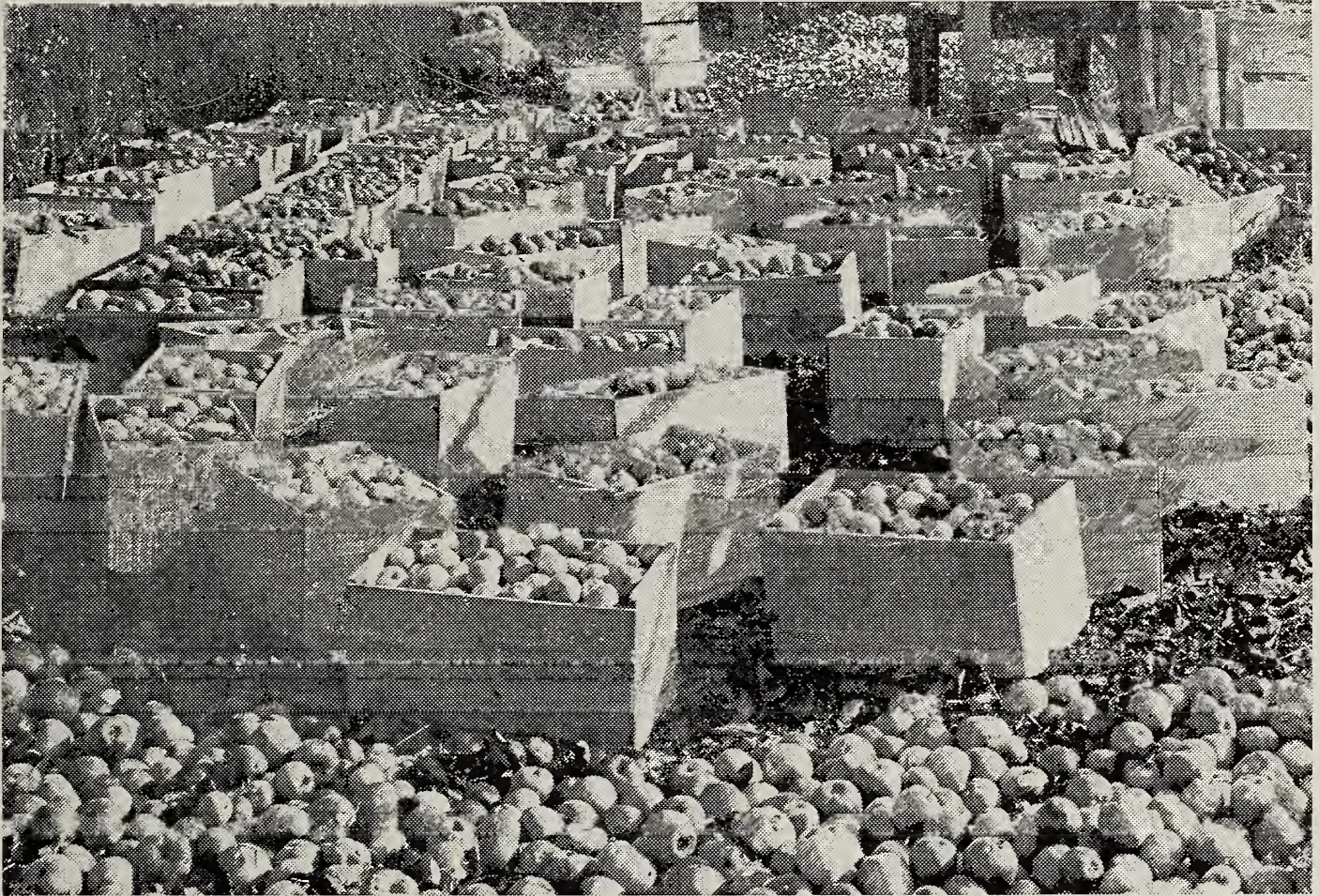
No. 199—30 acres, one mile from town; 15 acres cleared and mostly set out to fruit trees and strawberries; all under fence, with a fine creek of water running through it, which can be used for irrigating about 3 acres for garden which is very rich bottom land. Soil is light volcanic ash, very rich and good to keep up moisture in summer. Price, \$10,000.

No. 200—20 acres, unimproved, one mile from town; some level, some rolling. \$2,000; terms.

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Washington

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Q No restless nights when your competitors cut prices.
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27 Acres In a high state of cultivation, right in the heart of the valley, on main county road, only 3½ miles from Hood River; 16 acres in bearing commercial orchard, 9 acres of which is in Yellow Newtowns and Spitzenbergs 13 years old; 6 acres in Yellow Newtowns, Spitzenbergs and Jonathans 7 years old; 1 acre in Ben Davis 8 years old; 2 acres in Bing and Lambert cherries 4 and 5 years old. Most of the balance of the place is in meadow and alfalfa. Nine inches of water goes with the place. Improvements consist of large two-story frame house in good condition; new barn, just finished at a cost of \$1,500; suitable outbuildings. House and barn are electric lighted. This farm returned its owner \$5,500 in profits season of 1908. Will double in profits in three years, as the younger orchard comes into full bearing. \$5,000 under the market at price asked.

\$8000 Cash

Will handle it, and the apple crops will pay the balance.

Six Acres Finest kind of land, only three miles from the town of Hood River; five acres in commercial bearing orchard; some strawberries. Horse, wagon, chickens, implements and farm tools all go with place.

\$1500 Cash

Will handle it and will give five years' time on the balance. Price \$4,500. Genuine bargain and an ideal little home for some one.

INTENDING purchasers of fruit lands in this world-renowned district should STOP INVESTIGATING and buy at once, before prices rise, which they are bound to do in a very material way before the season advances very far. Having up-to-date offices in both Portland and Hood River and a corps of capable and experienced salesmen, we are in a position to show a prospective buyer the best properties in the Hood River Valley on the market today. See us and be convinced.

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BETTER FRUIT

A MONTHLY ILLUSTRATED MAGAZINE PUBLISHED IN THE INTEREST
OF MODERN AND PROGRESSIVE FRUIT GROWING AND MARKETING

THE ORCHARD PLANT LICE AND THEIR REMEDIES

BY PROFESSORS C. P. GILLETTE AND E. P. TAYLOR, COLORADO AGRICULTURE COLLEGE

THE plant lice that are commonly designated as "aphids" have very similar habits, structures and remedies. These should be known and understood by the farmer and fruit grower who have to contend with them. Nearly all of these lice are rather easily destroyed when proper remedies are intelligently applied to them. Probably the plant lice here mentioned are the most serious orchard pests in Colorado at the present time.

All of the plant lice get their food by inserting a beak and sucking the sap of the plant. They never eat away the tissue of the leaf.

Throughout the entire summer, from spring to about the first of September, all of our plant lice that infest orchard trees increase in numbers by giving birth to living young. If eggs are laid at all they are deposited by the last brood of females in the fall. From the fact that a single louse is usually able to give birth to from seventy-five to one hundred and fifty young, and, as they mature in about eight to ten days after being born, it will readily be seen that the plant lice are capable of increasing with wonderful rapidity. This accounts for the fact that the lice may nearly all be killed from a tree and that tree be very seriously infested with the lice again within a few weeks. Usually the last brood in the fall are about one-half males and one-half females. These females deposit the eggs that live over winter, and the lice all die. We have an exception to this rule, however, in the case of the woolly apple aphid, which lives over winter as young or partly grown lice upon the trunk and branches, and in all stages of growth upon the roots of the trees.

Plant louse eggs usually hatch in the spring, a little before the leaf buds begin to open on the trees that they infest. These early lice hatching from eggs are always wingless in species mentioned in this bulletin, and are called stem-mothers. These stem-mothers mature in a short time, are all females, and begin giving birth to young lice which constitute the second brood. It is seldom that the second brood of lice have more than a very few winged ones. The remainder of the life history of these lice will be given under the different species treated.

Whenever the aphids are abundant it is usually true that ants may be seen running over the infested tree or plant. It is often thought by the orchardist or farmer that the ants are present to destroy the lice, but this is probably never the case. Nearly all plant lice excrete from their bodies a sweet liquid known as "honey dew." This liquid, gathering upon the leaves of the plants, cause them

to be shiny and sticky, as if they had been varnished. The ants are very fond of this liquid and visit the lice to obtain it, and are always very careful not to injure the plant lice themselves.

The plant lice are greatly lessened in numbers every year by insect enemies. Most important among these are the "lady-beetles," the "syrphus flies," and

trunk and the limbs of the trees, but does not feed upon the fruit or foliage. This louse is readily recognized on account of its being covered with a white, woolly secretion, which has suggested its common name. Upon the trunk and branches the lice attack either the tender bark about the scars or the bark of tender new shoots. Below the ground the lice attack the bark of the smaller roots, causing warty swellings upon them. If very abundant, the roots are often completely covered with these smooth wart-like growths which sometimes cause the roots to die and rot off. When very abundant upon the very rapidly growing twigs, these lice often produce abrupt swellings, due to the thickening of the inner bark. Sometimes these swollen portions of the limbs crack open lengthwise and the limbs may be sufficiently injured to cause them to die. Severest injury is done to the tops, where there is the tenderest and most rapid growth, as in grafts and water sprouts.

The life habits of this insect may be briefly stated as follows: Early in the spring there will be a few living lice in protected places, beneath the bark or under the dead bodies of the lice that were killed the previous fall. There will also be a large number of lice living over upon the roots of the tree beneath the surface of the ground. The lice that live over on top are all very small. Those living over upon the roots are of all sizes, from the smallest to those that are fully grown. By the time that the buds begin to open in the spring, the lice that live over on top will locate on tender new bark and insert their beaks and begin to suck the sap of the tree and to grow in size. At the same time a greater or less number of small lice that live over the winter about the crown of the trees, and perhaps some that came up from the roots, migrate to the top and begin to feed and grow. These lice start the round of development for the year on the tree tops. They are usually first detected by the fruit grower when the little lice have grown enough to secrete a white covering to their bodies, which makes them appear like little mouldy spots upon the bark. These lice increase very rapidly in number, so that by the middle of June or first of July the tree may be very badly infested and the cottony secretion may be so heavy as to hang down and even fall from the bodies of the lice.

The lice are all wingless until about the first of September, when a occasional winged louse may usually be found upon the trees. These lice leave the trees where they develop and fly to others. Each of these winged lice gives birth to about four or five males and as many

CONTENTS

THE ORCHARD PLANT LICE AND THEIR REMEDIES

METHODS FOR CONTROL OF CODLING MOTH

PRACTICAL EXPERIMENTS WITH CODLING MOTHS

SOME RECENT WORK ON BORDEAUX MIXTURE

LIME-SULPHUR SPRAY PREVENTIVE OF APPLE SCAB

SOME NOTIONS ABOUT THE SPRAYING OF TREES

BILL PASSED AS SUBSTITUTE FOR THE PORTER BILL

EXPENSE vs. INVESTMENT IN FRUIT GROWING

WASHINGTON STATE COLLEGE SPRAY CALENDAR

the "lace-wing flies" or "aphis-lions." Wherever these are found upon the infested plants they should be carefully protected, as they often destroy the lice so completely that it is not necessary to make any application to kill the lice artificially.

The most common remedies for the destruction of plant lice are kerosene emulsion, tobacco decoctions, or soapy preparations. An insecticide that will destroy one plant louse will usually be effectual in destroying any other, if a thorough application is made.

Plant lice fly so freely from one orchard to another that it is very important that all of the orchardists in a community spray their trees whenever the lice are abundant. If one man should fail to do this, the plant lice leaving his trees would, in nearly every case, be sufficient to thoroughly colonize all of the orchards near him. Co-operation, then, is very important in any campaign against plant lice.

APPLE PLANT LICE

Woolly Apple Aphid

(*Schizoneura lanigera* Hausm.)

This is probably the most serious apple pest in Colorado. It is a bark feeder and it attacks both the roots, the

females. Before winter comes on each female deposits a single egg and dies. No one seems to have followed this part of the life history of the woolly aphid in the orchard. It is supposed that these eggs hatch the following spring and start new colonies.

Upon the roots of the trees the woolly aphid lives in large numbers the year around, the only difference in the winter being that the lice reproduce very slowly, so do not increase much in numbers. The cold weather seems never to be sufficient to kill them, even in our coldest climates where the apple is grown.

Prevention is nearly always better than the cure. Great care should be taken, therefore, when setting out a new

orchard, to prevent the introduction of this louse. Orchards are usually infested by the lice that are upon the roots of nursery trees when they are set out. All nursery stock should be thoroughly disinfected either by fumigation with hydrocyanic acid gas, or by very thorough spraying of the trees, both roots and branches, before they are set, with one of the remedies mentioned below for spraying tops.

One method of preventing injuries from this louse is to have all apple trees upon Northern Spy roots, as Northern Spy seems never to be seriously attacked by this insect.

If nursery stock is received with roots "puddled," covered with mud, the purchaser should insist upon this mud being

thoroughly washed off and the roots treated for woolly aphid, as this is one of the methods that the nursery man has of covering up woolly aphid upon his nursery stock.

To prevent the spread of the woolly aphid from tree to tree and orchard to orchard, the lice should be well cleaned out of the orchard before the first week of September, as it is about this time when the winged lice begin to fly about to spread the species.

Wherever this louse can be reached by sprays it may be destroyed like other plant lice, but one precaution is necessary, the spray must be applied with sufficient force to remove or penetrate the woolly covering. There are several spray materials that we have found entirely successful when thoroughly applied to this insect.

Kerosene Emulsion—According to our experience, a good kerosene emulsion has no superior for the destruction of this insect. It seems to penetrate the woolly covering rather better than most other insecticides. When used in the ordinary strength (1/15 oil) we have always found it efficient. In the proportion of one-twentieth oil (5 per cent) we have usually found it sufficiently strong if applied with a good deal of force and thoroughness.

To be most successful, apply as a moderately coarse spray and with a pressure, if possible, of one hundred and forty to one hundred and eighty pounds.

Scalecide and Other Miscible Oils—There are upon the market a number of so-called miscible oils, which, when put into water, break up at once into very fine particles, forming a milky-white emulsion. These oils we have found fairly successful. Two to three gallons are used in each one hundred gallons of water. After being prepared, if these oils separate out so as to form an oily film upon the surface of the water, they should not be used.

Soaps—We have found the standard whale oil soaps, such as Good's Whale Oil Soap and Bowker's Tree Soap, quite effectual for the destruction of this louse, when used in the proportion of one pound of soap to each six or eight gallons of water.

Black Leaf—The Kentucky Tobacco Product Company, of Louisville, Kentucky, manufacture a tobacco extract which they sell under the above trade name and which has become very popular among the orchardists of Delta County, Colorado, as a spray for orchard plant lice. We have tested it quite thoroughly and have found it very efficient for the woolly aphid if used in the proportion of one gallon of the Black Leaf in sixty-five to seventy gallons of water. In fact, we have usually been successful when using Black Leaf as weak as one gallon to one hundred gallons of water. This strength, however, requires a very thorough application. It would be a good plan for anyone to treat a few trees with varying strengths of this or any other insecticide for the destruction of lice, a day or two before taking up his general spraying work, for the purpose of determining whether or not the strength that he contemplates using is sufficient to kill the lice. In this way he may save many dollars, from using the insecticides in a strength that will not do the work or in a proportion unnecessarily strong.

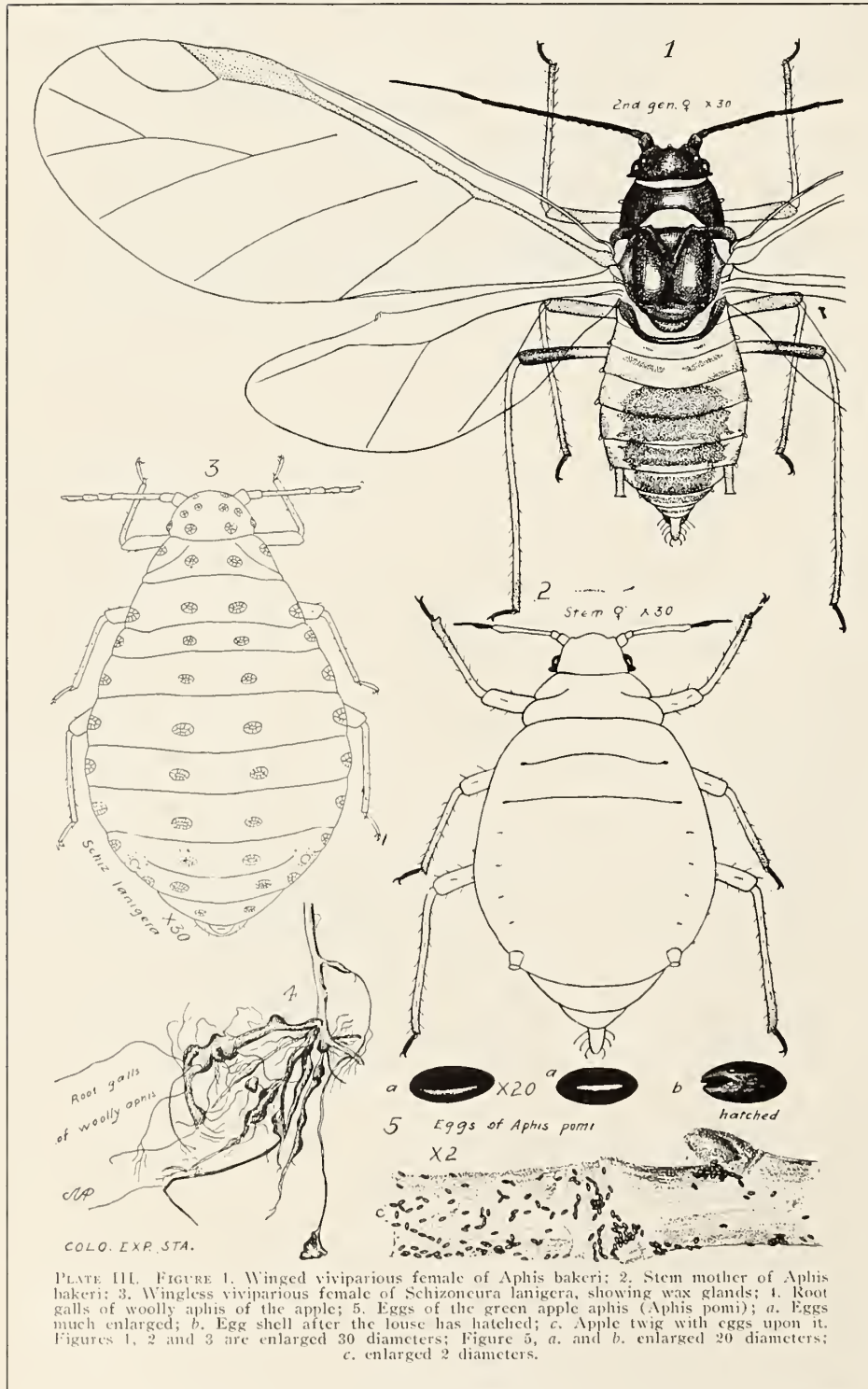


PLATE III. FIGURE 1. Winged viviparous female of *Aphis bakeri*; 2. Stem mother of *Aphis bakeri*; 3. Wingless viviparous female of *Schizoneura lanigera*, showing wax glands; 4. Root galls of woolly aphid of the apple; 5. Eggs of the green apple aphid (*Aphis pomi*); a. Eggs much enlarged; b. Egg shell after the louse has hatched; c. Apple twig with eggs upon it. Figures 1, 2 and 3 are enlarged 30 diameters; Figure 5, a. and b. enlarged 20 diameters; c. enlarged 2 diameters.

Tobacco Decoction—If any prefer to make their own tobacco decoctions, they may use tobacco stems or tobacco dust or whole leaf tobacco. Fruit men, however, have not reported very uniform results from their own preparations. This may be due to adulterations in the tobacco, or from different methods of preparing the decoction. For the preparation of tobacco decoctions, see under "Preparation of Insecticides."

It might be advisable for one who has very much spraying to do to grow his own tobacco. Mr. W. S. Coburn, president of the Colorado State Board of Horticulture, tells us that he has had excellent success using tobacco of his own raising. He uses the whole leaf and makes a decoction, using one pound of tobacco for each six gallons of water. The tobacco is steeped for at least one hour and then applied warm.

Lime-Sulphur Sprays—The lime-sulphur sprays have not been successful in destroying the woolly aphid during the summer season, when the body is covered with the woolly secretion. It has been fairly successful when applied two or three weeks before the buds open, for the destruction of the little lice that live over winter upon the trees and which do not have their bodies protected by the secretion.

So far, the remedies mentioned have been for summer treatments, when the bodies of the lice are more or less covered with the waxy secretion. We believe the best time to get results in the treatment of this louse is late in the winter or early in spring before the buds open. This is not because the lice get protection from the opening buds, but because by the time the buds have opened the lice have their bodies more or less covered by the waxy secretions that protect them to some extent from the effects of the insecticides.

Orchards in the Grand Valley, treated early in the spring of 1907 for the destruction of the eggs of the green apple aphid, were also largely freed from the woolly aphid. The insecticides that were found successful in the destruction of these little over-winter lice, were:

Lime, 15 pounds; sulphur, 15 pounds; water 30 gallons.

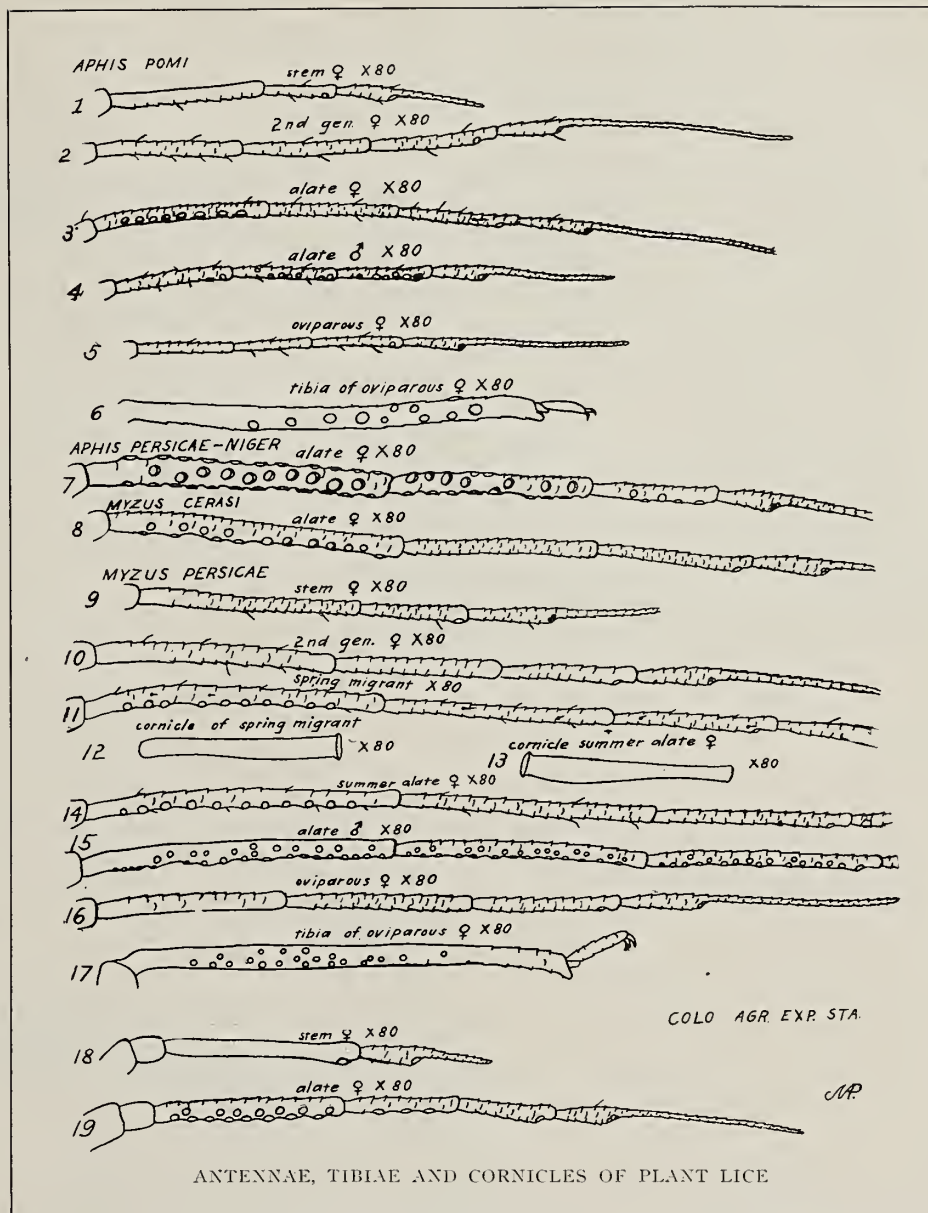
Lime, 15 pounds; sulphur, 15 pounds; water, 45 gallons.

Rex lime-sulphur, 1 gallons; water, 7 gallons; lump lime, 2 pounds.

Lime, 15 pounds; sulphur, 15 pounds, and water, 60 gallons, was a little weak and did not give results that were fully satisfactory, and the same was true of Rex, 1 gallon; water, 7 gallons; without the addition of lime.

We have no doubt but what the kerosene emulsion, the soluble oil sprays, the tobacco sprays, and the whale-oil soaps mentioned above could also be used successfully as early spring sprays for the destruction of the over-winter lice upon the tree tops, though we have not tested them in that way. As they are not as successful for the destruction of the eggs of the green apple aphid, and as the orchardist is likely to want to destroy both of these lice at the same time, if possible, it is probable that the lime-sulphur sprays will become most popular for early spring applications.

To get the best results on the woolly aphid the spring application should be made fully a week or ten days before the apple buds begin to open at all, and



ANTENNAE, TIBIAE AND CORNICLES OF PLANT LICE

the trunk and crown of the tree should be thoroughly drenched. Then, as a final act for best results, put Tanglefoot bands about the trunks of the trees, so that the lice at the roots cannot migrate to the top.

In the experiments upon the Western Slope in particular, large numbers of Tanglefoot bands have been used. This material is put out by the O. & W. Thum Company, Grand Rapids, Michigan, and is the sticky material put upon the Tanglefoot Flypaper. When at all abundant upon the trees the newly-born lice are much inclined to travel about, and it is often astonishing to see the number of lice that will be captured in these bands. On the 7th of June, 1907, it was estimated that bands that had been on since the preceding fall had as many as 100,000 lice each in many cases. The bands remain fresh for several months, and may be quickly freshened by rubbing a paddle over them when they become filled with insects and dirt.

Apparently these bands do no harm to trees, but what their effect might be when continued for years we are unable to say. (Mr. Geo. P. Weldon, reports, from recent observations upon the Western Slope in Colorado, rather severe

injuries from the application of Tanglefoot bands that have been directly upon the bark for a year or more.) In most instances we have put them directly upon the bark but it would be safer, so far as any possible injury to the tree is concerned, to put a band of stout paper around the trunk and then put the Tanglefoot upon that. To make certain that no lice should pass under the band, a light band of the cheapest cotton batting under the paper would be advisable. This band, in connection with the spring spraying mentioned above, we believe to be the surest method of freeing the tree tops of woolly aphid.

The woolly aphid is not a burrowing insect in any true sense of the word. The lice that come down the trees get into the ground by way of the cracks or other openings in the soil that are large enough to allow them to enter. The lice that sometimes infest distant roots do not get to them by crawling there all the way from the crown of the tree, but they get down to them directly from the surface above. So far as possible, the descending over-winter lice congregate about the crown of the tree where they are able to get below the surface in the large cracks between the trunk

and the earth. The migration both to and from the roots can be somewhat, often very largely, prevented by cultivating the surface of the soil and by stirring and compacting and even slightly mounding the earth about the crown of the tree and by re-stirring this earth when it becomes compact after a rain or an irrigation.

When the lice become very abundant upon water sprouts and suckers, something can be done to lessen the number by thoroughly cutting out these growths. A thorough thinning of the top so that plenty of sunlight can enter has been noticed to lessen the number of lice which find the most congenial locations for their development in dense shade and upon the north side of the limbs, at least in sunny Colorado.

The treatment below ground is all aimed at the lice that are within three feet of the crown of the tree and within one foot of the surface. It should also be remembered that the same substances that will kill the lice above ground will also kill them below ground if they can only be put in contact with the lice, and then the orchardist should be cautious not to accumulate in the soil about the crowns of his trees substances that are likely either presently or after years of repetition, to do his trees an injury.

A rather extensive series of experiments for the purpose of testing various substances that seemed to offer some promise of good results were carried through in irrigated orchards of the Grand Valley in Colorado, a summary of which is given below.

The experiments were begun in the fall of 1906 and the winter following. The materials used upon the roots were kerosene emulsion, Scalecide, Chloroleum, Black Leaf dip, tobacco dust, tobacco dust decoction, tobacco stems, tobacco stem decoction, quicklime, lime-

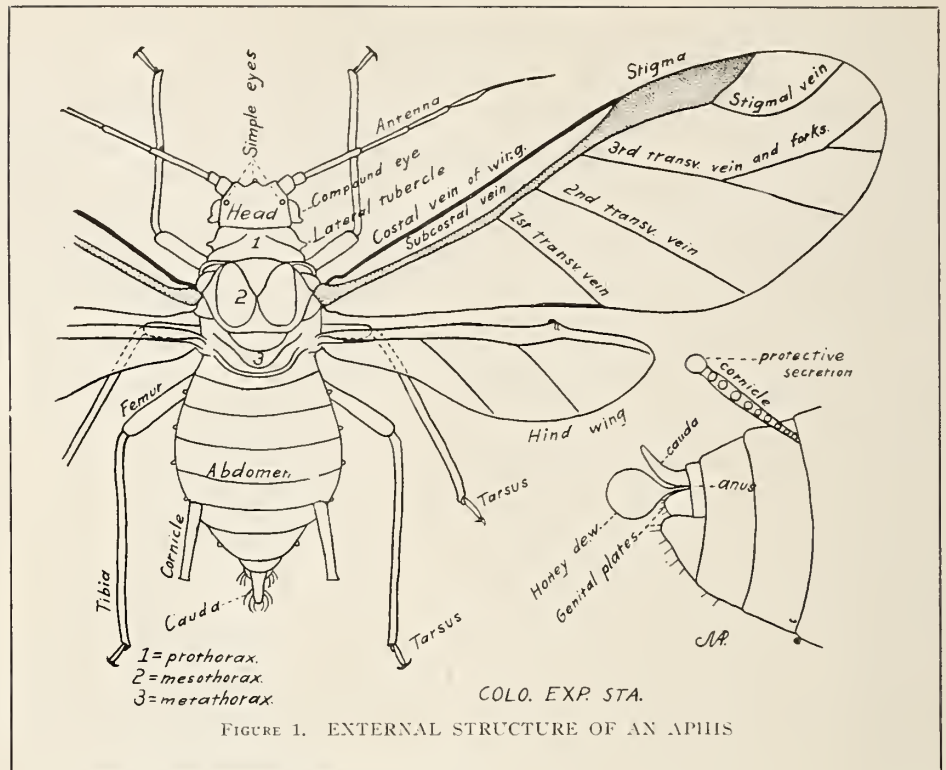


FIGURE 1. EXTERNAL STRUCTURE OF AN APHIS

sulphur mixture, Rex lime-sulphur, whale-oil soap, and carbon bisulfid.

Before making the applications the earth was removed over the main roots to a depth of about six inches, and for a distance of about two feet upon all sides, of each tree. One man on an average would expose the roots of about 100 trees a day. Into these dirt basins, which varied some in depth and diameter with the size and depth of the roots of the trees, the liquids were force-

fully sprayed so as to well drench the exposed portions. And when the liquid had nearly or quite soaked into the ground the basin was filled in again and the earth banked well about the trees. In hard, compact soils it is best to irrigate a few days prior to making the treatment so as to loosen the soil, and lessen the labor of excavating about the trees.

Summing up the results to September, 1907, it may be said that practically all strengths of kerosene emulsion (3% to 50%), killed the lice well when the roots had been well treated. Where less than 6% of oil was used, the odor of kerosene soon disappeared and reinfestation soon took place by the lice that migrated downward from the top. Where 7, 10 and 15% of oil was used the effect was still more lasting; and the 20, 33 and 50% treatments gave practically perfect freedom from lice about the crown and roots throughout the season.

A later examination was made by Mr. George P. Weldon, 1908. Mr. Weldon found the woolly aphid about equally abundant upon the treated and untreated trees in all of the blocks. Even those that were treated with 50% kerosene emulsion were badly infested upon the roots at the time that he made his examination. So we have to conclude that any treatment for the destruction of the woolly aphid upon the roots is only of temporary value. But the stronger preparations do repel the lice for a short period of time, perhaps two or three months. Mr. Weldon also found that where the 50% emulsion was used the trees appeared to be seriously affected and probably would not live through another year. None of the weaker preparations seem to have done any injury to the trees.

Just before the buds open in the spring, spray very thoroughly with a 7% kerosene emulsion, a 1 to 60 Black Leaf dip (or some other strong tobacco decoction), or a good whale-oil soap, one pound to six gallons of water. Spray

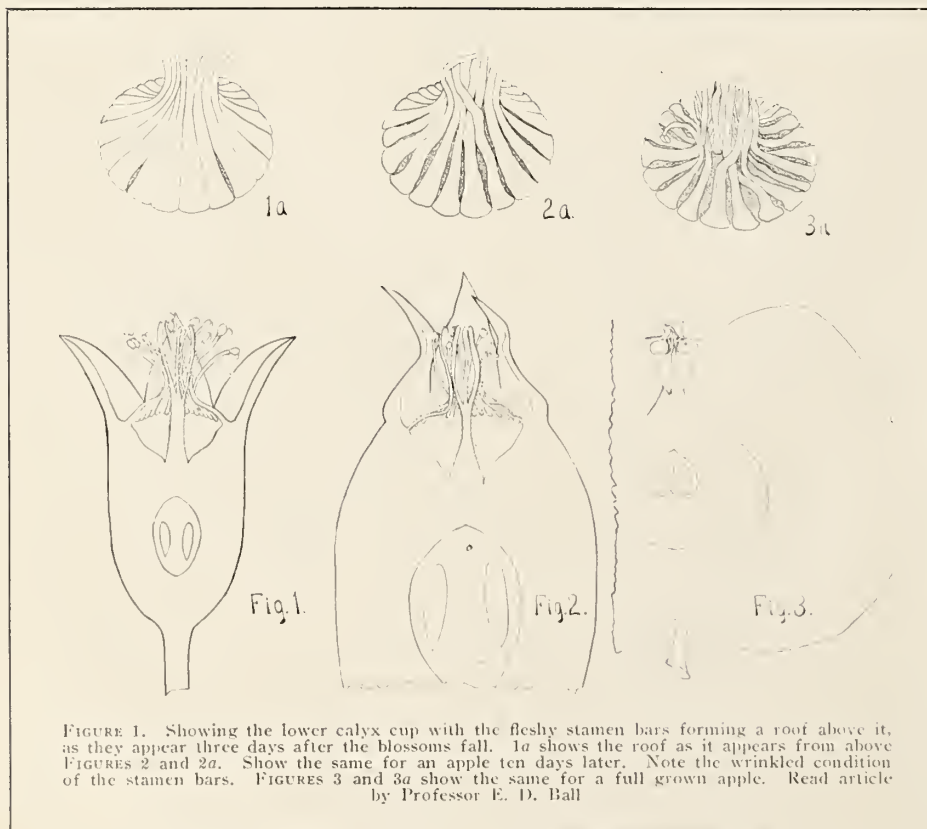


FIGURE 1. Showing the lower calyx cup with the fleshy stamen bars forming a roof above it, as they appear three days after the blossoms fall. 1a shows the roof as it appears from above FIGURES 2 and 2a. Show the same for an apple ten days later. Note the wrinkled condition of the stamen bars. FIGURES 3 and 3a show the same for a full grown apple. Read article by Professor E. D. Ball

the entire trunk and also the ground about the crown of the tree at the same time. Immediately after treatment apply a Tanglefoot band over cotton so as to prevent the upward migration. If the lice become very numerous at any time upon the tops, spray them forcefully with the 7% emulsion, or Black Leaf, one part in seventy parts of water.

Root treatments are temporary in their effects. When the roots become very badly infested treat as above described with 10% kerosene emulsion, Black Leaf dip (1 to 50), two to three gallons to a tree, or if the soil is quite open and porous, carbon bisulfid. This insecticide has often been reported successful against this insect.

A splendid opportunity was afforded to observe its results in the 20-acre orchard of Mr. F. D. Barney, where about 200 pounds of the liquid was used on 12-year-old apple trees. The treatment was begun on April 11, 1907, and was continued several weeks.

A shovel was thrust deeply into the ground about eighteen inches to two feet from the base of the tree with the blade broadcast to the tree. The handle was then tipped forward and the carbon bisulfid poured into the bottom and at the center of the opening at the back of the shovel. The shovel was then withdrawn and the earth packed upon the spot treated. The liquid was not poured directly upon the roots. From three to six holes were treated in this way about each tree and about three ounces of the liquid used. At this rate the cost of the material did not amount to as much as three cents per tree.

Dry tobacco in the form of tobacco dust or tobacco stems or even the whole

leaf tobacco when used freely about the trees has not given very satisfactory results. Apparently these substances are of no use unless the tobacco is thoroughly wet as soon as it has been placed about the roots, so that the juice will penetrate the soil and kill the lice. In a few instances orchardists have reported very satisfactory results, but in nearly all cases they have reported failure. We believe if tobacco is used at all against this insect upon the roots of trees the best method is to apply it in the form of a strong decoction.

Prepare as for a top spray and use two or three gallons about each tree, as in case of kerosene emulsion as outlined above. The tobacco does not have as lasting an effect, apparently, as does the emulsion. Tobacco decoction in which two pounds of stems or dust, or one pound of whole leaf tobacco was used to each three gallons of water and forcefully sprayed upon the exposed roots gave fairly good results, but these were not equal in their killing and repelling effects to a 10 per cent to 15 per cent kerosene emulsion.

Black Leaf dip used in the proportion of 1 gallon in 65 gallons of water gave results similar to the preceding.

Scalecide used 1 to 40, 1 to 50 and 1 to 60 in water killed the lice fairly well,



PROFESSOR W. S. THORNBUR
Horticulturist, Agricultural College, Pullman, Washington. One of the ablest and most successful men in his line of work, his works annually adding thousands of dollars to the State of Washington

but had very little repelling effect afterwards.

Lump lime applied in a manner similar to that employed with the tobacco stems, 10 to 20 pounds to a tree, was of little or no benefit.

Soaps used for root treatment were of doubtful benefit.

Some wholly unsuccessful substances were "Chloroleum" potash lye, wood ashes, salt, and flooding with water for several hours.

Green Apple Aphis

(Aphis pomi DeGeer)

This is the common green louse curling the leaves of the apple tree in Colorado. While primarily a leaf feeder, this louse also attacks the tender tips of growing shoots, especially grafts and water sprouts. This insect ranks close to the woolly aphis in extent of injuries to the apple trees. It also attacks the pear, the thorn and the quince quite freely. This louse remains upon the apple, or closely allied trees, throughout the year and does not go upon other trees or vegetables.

The first lice in the spring hatch from eggs that were deposited the previous fall upon the twigs of the trees. These first lice hatch a few days before the buds open, and are ready to insert their sharp beaks into the first tender green tissue of the opening buds. These lice are all females and become fully grown in about two or three weeks, when they begin giving birth to living young. From this time on the lice increase very rapidly if they are not kept down by their natural enemies or the insecticides of the orchardist.

At first all the lice are wingless, but by the 10th to the 15th of May in the warmer portions of the state, and about two weeks later in the cooler orchard sections, the winged lice begin to appear and to fly from tree to tree and orchard to orchard with the prevailing winds.



A MODEL ROGUE RIVER VALLEY ORCHARD

View of the 401 Orchard, recently sold by Dr. E. B. Pickel of Medford, Oregon, for \$100,000. This orchard now consists of 561 acres, though originally it contained 401 acres, hence the name, and it is conceded to be one of the finest orchards in Rogue River Valley. And this commendation means that it is a model orchard in all that goes to make up such. The soil is rich, black and deep, locally known as "sticky," but demonstrated to be among the most productive land in that valley. The hexagonal system of planting is used, the apple trees being set thirty-two feet apart and the pears twenty-six feet apart. Of apples there are only three varieties, Newtown, Spitzenberg and Jonathan. To insure a more perfect pollenization the varieties are alternated in ten rows of Newtowns, four rows of Spitzenbergs and two rows of Jonathans. One-third of the orchard is to pears, the varieties being Comice, d'Anjou, Winter Nellis, Buerre Bosc and Bartlett, the first named predominating in number. The 401 Orchard is six miles from Medford and one and a half miles from the Pacific & Eastern, a local railroad out from Medford. The intervening land is being set to orchards. From the broad veranda of the dwelling house on the 401 Orchard is to be had one of the grandest views in all Rogue River Valley. In the foreground is the broad expanse of valley dotted with orchards, alfalfa fields and homes, with historic Table Rock, the stronghold of the Rogue River Indians in the years gone by, in the background, and the oak and pine-clad foothills of the Siskiyou Mountains in the distance.

About the first week in September little brown wingless males and green wingless egg-laying females will appear, and a little later the females will begin laying green eggs that soon turn black upon the apple twigs. The freezing nights in

lice before the buds open in the spring, or for the destruction of the lice upon the leaves during the growing season.

Kerosene Emulsion in all our experiments has proven useless for the destruction of the eggs except when applied so strong as to make it entirely impractical to use it.

The Lime-Sulphur Mixtures—Either the 1-1-2 or the 1-1-3 formula or Rex lime-sulphur in dilutions down to one gallon in eight gallons of water, have given good results. Lime-sulphur by the 1-1-4 formula is a little weak for good results.

Black Leaf—This preparation used in the proportion of one gallon in twenty-five, and one gallon in thirty-three of water gave good results, but one gallon in forty gallons of water was not very satisfactory, many of the eggs hatching.

For the destruction of the lice upon the leaves spray very thoroughly and forcefully from all directions with kerosene emulsion, 5 to 7 per cent oil; black leaf, 1 part in 70 parts of water; or one of the other plant louse sprays discussed at the close of this bulletin, remembering that thorough and forceful applications are necessary in order to get best results.

Peach Plant Lice

There are two species of plant lice attacking peach trees in Colorado, the Green Peach Aphis (*Myzus persicae* Sulz) and the Black Peach Aphis (*Aphis persicae-niger* Smith). The former is very generally distributed and occurs nearly everywhere that this fruit is grown, while the latter occurs in isolated orchards only, and might be kept down so as to do no appreciable harm, and it is quite possible that it might be practical to exterminate it.

The Green Peach Aphis

It is distinguished by its pale green or yellowish color in the wingless forms, and the winged lice have the same general ground color to their bodies, with more or less black markings above.

The lice appear very early in the spring and often attack the blossoms, and the young peaches when the latter first form, causing them to wilt and drop. Later it attacks the leaves, causing them to curl and turn yellow. By the middle of the summer this louse leaves the peach trees and goes to cabbages, turnips, radishes, tomatoes, potatoes and other growing crops, as well as many of the common weeds. The lice remain upon these plants during the summer and in the fall there are winged forms that return to the peach to give birth to true males and females, the latter of which deposit the eggs that remain upon the twigs of the trees during the winter to hatch out the early lice of the following spring.

Spray thoroughly with kerosene emulsion, Black Leaf (1 part in 60 of water), or a solution of whale oil soap (1 pound to 6 gallons of water), about three or four

days before the blossoms open. Then, if the lice appear later, treat as in case of the green apple aphid.

The Black Peach Aphis

This louse is readily distinguished from any other attacking the peach by its black color when fully grown, whether winged or wingless. The immature lice are of a yellow or amber color. In all stages, and especially in the spring, this louse will be found upon the bark of the small limbs, where it continues to feed after the leaves appear. Many of the lice will go upon the leaves, also causing them to curl.

Like the preceding species, this louse also disappears by the middle of July or the first of August without anything being done for it, but it does not go to any other plants, so far as known, but is said to descend to the roots of the peach, where it remains until the follow-



SENATOR W. H. PAULHAMUS
Of Sumner, Washington, elected president of the
Northwestern Fruit Growers' Association for 1909

November or early December kill all the lice and the eggs live over to hatch the following spring.

Treatment for this insect may be for the destruction of the eggs and young



J. L. DUMAS, ORCHARDIST, DAYTON, WASHINGTON
President Washington State Horticultural Society, 1909



PROFESSOR WENDALL PADDOCK,
Horticulturist Colorado Experimental Station
Fort Collins, Colorado
Whose splendid article on pruning was published in December issue of "Better Fruit"

ing spring. So far as known this species does not lay eggs, but lives over winter as a louse.

This insect is continually being shipped into Colorado upon the roots of nursery stock. Our horticultural law and the vigilance of our county horticultural inspectors has done much to keep it out of the orchards, but it is impossible, under the present methods, to prevent an occasional tree, infested with this louse, being planted.

All peach trees, before being planted, should be thoroughly fumigated, or dipped or sprayed with black leaf, a home-made tobacco decoction, or a good kerosene emulsion.

The remedies in the orchard are the same as for the green peach aphid mentioned above.

PLUM PLANT LICE

The Mealy Plum Louse

(*Hyalopterus arundinis* Fab.)

A light green louse with a rather long, narrow body that is covered with a fine white powder. The lice occur upon

the under side of the leaves, which they may completely cover by the middle of June, but the leaves do not curl. By the first week in July many of the lice are winged, and by the last of that month the lice will nearly all have left the plum. The lice go to certain grasses, especially the large coarse reed grass growing in wet places. In the fall winged migrants return to the plum where, later the eggs are deposited by egg-laying females, and the lice all die. The next spring the eggs hatch to continue the species.

Spray as for the green peach aphid, but use a heavy pressure and direct all of the spray upon the under side of the leaves, where all the lice are. These lice are killed with difficulty on account of the powdery covering upon their bodies.

The Rusty Plum Louse

(Aphis setariae Thos.)

This louse is readily distinguished from all others upon the plum by its dark brown body color, and with a hand



DR. E. D. BALL

Director of Experiment Station, Logan, Utah. The first man to advocate present methods of spraying for codling moth in the Northwest, now in general use in Utah, Oregon, Washington, Idaho, Colorado and Montana. Don't fail to read the article, "The Control of Codling Moth," by Dr. E. D. Ball, in this issue.

lens one can usually see the conspicuous white legs, antennae and tail. This louse seems to have a preference for the tender bark near the tips of rapidly growing shoots although it covers the undersides of the leaves also. At a little distance the louse may almost appear black to the naked eye. This louse spends the entire year upon the plum, though it is known to attack barn grass (*Echinochloa Crus-galli*).

The remedies for this louse are exactly the same as for the green peach aphid already mentioned.

The Black Cherry Louse

(Myzus cerasi Fab.)

This louse has long been known in Europe as a pest upon cherry trees. It is generally distributed throughout the cherry growing districts of the eastern slope of Colorado, but as yet only occurs in isolated orchards upon the western slope. Those having cherry trees should

make a vigorous attempt to exterminate this louse as soon as it is noticed in the cherry orchards. It could not be mistaken for any other insect upon the cherry tree, as it is deep black in color and infests the under side of the leaves and the bark of the tender new growth. It is usually accompanied by ants in abundance. This insect remains upon the cherry, and, so far as known, does not migrate to any other plant. On account of its numerous insect enemies it is likely to almost disappear for a time during the middle of the summer, but may continue quite abundant all through the season. The last brood in the fall lay eggs, which carry the species over winter to hatch in the spring.

The remedies are exactly the same as for the foregoing species.

The Hop Plant Louse

(Phorodon humuli.)

This is the green louse that has caused such severe losses in hop yard. The hop is the summer food plant and in the fall winged hop lice migrate to the plum trees where the egg-laying females later deposit eggs upon the branches, which hatch the following spring. These lice are very similar to the preceding in general appearance, but lack the heavy covering of powder. While most of the lice leave the trees for the hop before the middle of July, we have found some of the lice remaining throughout the summer on plum leaves.

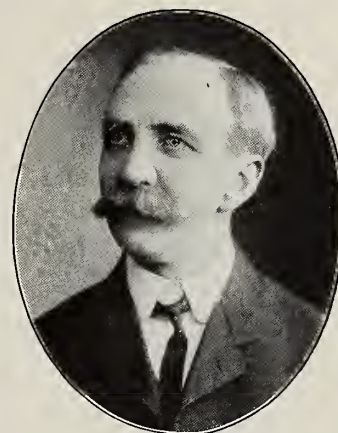
The remedies are the same as for the green peach aphid.

PREPARATION OF INSECTICIDES

Kerosene Emulsion—Prepare in the following proportions: Soap, one-half pound; water, one gallon; kerosene, two gallons.

To prepare, dissolve one-half pound of soap in one gallon of soft water by boiling; when well dissolved and still boiling hot, remove from the fire and add two gallons of kerosene and agitate at once as briskly as possible. If large quantities are being made, a good way to emulsify is to use a force pump and spraying nozzle and pump the mixture as forcefully as possible back into the vessel containing it. If the emulsion is properly formed, the whole mass will appear much like whipped cream, and will mix readily in water without a film of oil rising to the top. Sometimes, when the oil is rather cold, it lowers the temperature so much that a good emulsion is not

obtained. In this case, the dish may be placed back over the fire and the mixture heated to the boiling point, when it must be again removed and agitated to form the emulsion. In case the mixture of soapy water and kerosene is placed



S. H. BOLTON
Twin Falls, Idaho, who has an article in this number

over the fire, it must be watched every moment to see that it does not quickly boil over and take fire. As soon as emulsified, add twenty-seven gallons of water and use at once. This will make thirty



PROFESSOR C. P. GILLETTE

Entomologist of the Colorado Experiment Station, Fort Collins, recognized as a leading authority, author of the article, "A Few Orchard Plant Lice, Including Green and Woolly Aphid," appearing in this issue.

gallons of the mixture, and such an emulsion will be one-fifteenth oil (or a seven per cent emulsion). This is the strength ordinarily used for the destruction of insects upon plants. For larger

Sometimes the emulsion is not perfect and a little oil rises to the top. In such cases, if the last in the barrel or tank is pumped out upon the foliage it is likely to burn it. So it is advisable, unless the emulsion is of good quality, to throw out the last few gallons.

It is best to dilute and apply kerosene emulsion as soon as it is prepared.

Avoid using alkali or any hard water in making the emulsion, as it will cause the oil to separate and rise to the top.

water has reached the boiling point, remove some of the fire and allow the water to simply simmer for fully one hour, when liquid is ready to be drained off, diluted to the above proportions and applied.

If the whole-leaf tobacco is used, prepare as above, using one pound of tobacco to each four gallons of water.

No lime or other alkaline substance should be added to the tobacco while cooking. Apply at once, or within a few days after making, if possible.

Black Leaf—There is nothing to do in the preparation of Black Leaf except to thoroughly stir the contents of the can before pouring out any quantity for dilu-

any of these, such as "Scalecide" or "Target Brand Scale Destroyer" or "Killo-scale," add the oil directly to the water with a little stirring. One gallon of the miscible oil in thirty to fifty gallons of water will make a mixture which, in most cases, will be strong enough to kill plant lice, if thoroughly applied.

Lime-Sulphur Mixture—(For winter spray only)—Flowers of sulphur, fifteen pounds; good lump lime, fifteen pounds; water, forty-five gallons.

This is 1-1-3 lime-sulphur mixture. First slake the lump lime with sufficient warm water, and while still boiling hot add the sulphur and stir it in. Place over fire and continue the boiling.



PICKING WINTER APPLES, SPOKANE, WASHINGTON

Any clean, soft water will usually give good results.

If a stronger emulsion is to be used, prepare as above, but do not use as much water in making the dilution. For example, if seventeen gallons of water were added in place of twenty-seven to dilute the emulsion, it would be one-tenth of oil or a ten per cent emulsion, and if thirty-seven gallons were added it would be a five per cent emulsion.

Those who have trouble in making kerosene emulsion can procure a commercial article, known as "Aphicide," manufactured at Grand Junction, or else use one of the tobacco preparations instead.

Tobacco Decoction—Tobacco stems or tobacco dust, two pounds; water, four gallons.

Put the tobacco in the water, enough to cover, which may be either cold or hot. Place over the fire, and when the

water has reached the boiling point, remove some of the fire and allow the water to simply simmer for fully one hour, when liquid is ready to be drained off, diluted to the above proportions and applied. In most cases one gallon of the Black Leaf will be found sufficient for each seventy gallons of water. But if in the treatment of any louse this does not seem sufficient it may be used in proportion of one gallon to sixty or sixty-five gallons of water. We have usually succeeded in killing plant lice with this preparation in the proportion of one gallon to each one hundred gallons of water. Thoroughness of application is of as much importance as the strength of the material used.

If this substance is not obtainable in your home town it may be procured from the Watkins Merchandise Company, Denver, or the Kentucky Tobacco Product Company, Louisville, Kentucky.

Miscible Oils—There are several miscible oils upon the market which may be added directly to water, forming a milky emulsion at once. In the preparation of

adding water when necessary, until the mixture changes to a deep reddish brown color which indicates that the lime has cut the sulphur. It will be necessary to boil steadily for about forty minutes to one hour to produce this result. The mixture should then be diluted to form forty-five gallons of the spray, and should be applied at once.

When the lime-sulphur mixture is placed in the barrel or tank it should be strained, to take out all lumps that would clog the spray nozzle. If allowed to stand for any great length of time after being prepared, the lime-sulphur crystallizes out to a considerable extent. In such a case it is necessary to heat the mixture again before applying so as to dissolve all the crystals. If the crystals are re-dissolved the mixture will be as strong as before.

Continued on page 43

METHODS FOR CONTROL OF THE CODLING MOTH

BY E. D. BALL, AGRICULTURAL EXPERIMENT STATION, LOGAN, UTAH

THE development of the present efficient methods for the control of the codling moth has not been the result of the work of any one man, or even of one generation of men. Banding and scraping the bark were practiced by our forefathers. No satisfactory remedy, however, was known for the pest until after the discovery of the value of spraying with the arsenicals for leaf-eating caterpillars, which was made in the early '70s. While using this remedy for other insects it was found that the codling moth was reduced in numbers at the same time. From this accidental discovery has arisen, by slow steps, the method of control used in the Eastern

While this was going on in the East, Western orchards were growing and the codling moth, with the spirit of the age, migrated westward, and through its rapid multiplication under our favorable climate soon threatened the destruction of our growing fruit industry. With the rapid increase in the number of worms to fight came a corresponding decrease in the success obtained, and a large number of the fruit growers became discouraged. To cap the climax the word went forth that the poisons were being adulterated to such an extent that they were of very little value, and as a result many abandoned the fight. A few of the more persistent, however, only redoubled

of these studies the Professor published the statement that the insect produced only two broods annually in that state. The first season's work in Utah convinced the writer that the insect had the same number of broods in this section as it had in Colorado, and he also succeeded in proving by experiment the great value of the driving spray. Armed with these results, this method of spraying was publicly advocated and presented to the Northwestern Fruit Growers' Association in Portland in January, 1904. This was its first presentation to any horticultural body, and its reception was not flattering. Flattening, in fact, would be a much more accurate description of



EXHIBIT AT THE NATIONAL APPLE SHOW, SPOKANE, WASHINGTON, WINNING THE "BETTER FRUIT" CUP FOR THE BEST COMMERCIAL PACK, FIRST PRIZE FOR THE BEST FOUR-TIER NEWTOWNS, SECOND FOR THE BEST TEN BOXES OF NEWTOWNS.

The Apple Growers' Union of the White Salmon Valley, of Underwood, through W. F. Cash as agent, won three important premiums on its 100 boxes of apples exhibited at the National Apple Show at Spokane. The union is incorporated for \$2,000, with headquarters at Underwood. Practically all the growers in the valley are members, and they feel highly encouraged at the prospects for their success. They have plans prepared for a warehouse 100x100 feet, which will be erected this spring in time for the berry crop. A railroad up the valley from Underwood is now assured, which will develop a territory nearly equal to Hood River Valley in extent. This will make Underwood one of the heaviest shipping points on the North Bank Railroad, as there is already a large acreage of young trees and more being planted. This section is especially fortunate in securing people of means and refinement, who are coming in largely as a result of this exhibit.

states today. To control the leaf-eating insects it was necessary to use a fine mist spray. They were also troubled with fungi and soon learned to mix bordeaux with it, and this triple combination spray is largely used up to the present time. Spraying for everything at once means spraying for nothing in particular, and as a result it was necessary to put on a large number of sprays to accomplish the purpose, and even then the results were poor, eighty to eighty-five per cent of sound apples being the exception rather than the rule. Several men were conspicuous in helping develop these methods, and in adding to our knowledge of the life habits of the insect. Professor Cook of Michigan and Professor Forbes of Illinois perfected the use of the arsenicals. Dr. Howard, of the Government Bureau, added much to our knowledge of the insect. Professor Card of Nebraska found out where eggs were laid, while Professor Slingerland of Cornell gave us the most complete treatise on the insect that has been written.

their labors, and as the worms increased, increased the number of sprayings and thus held their own in the contest. Professor Simpson was sent out by the Government to introduce the Eastern method of spraying. Through the fact that he used power sprayers he succeeded in obtaining even better results than they had obtained in the East. He evidently did not realize the importance of the extra power applied in getting these results, however, as he was very careful to recommend the use of a fine mist and gave directions to cease spraying as soon as the trees began to drip.

The writer came to Utah in 1902, just at the time when things were at their worst. The worms were increasing in numbers, one brood was supposed to follow another in quick succession; the poison was said to be adulterated, and many people who had formerly been successful were now losing their crops and knew not why. The writer had worked on this insect with Professor Gillette in Colorado for five years, and as a result

just what happened at that meeting. The same idea was, however, presented the next year before the same association, at Boise, Idaho, but backed up with all the figures at the writer's command, as well as by the results obtained by Utah growers the previous year. Others by this time had tried the method and it was accorded a somewhat different reception. Bulletins were published on these experiments and further details given before the fruit growers' meeting at La Grande, Oregon, in 1906. Mr. Eldred Jenne published the results of an investigation on this insect's life history in the State of Washington, in 1905, and Professor Melander and Mr. Jenne published the results of their first tests of this method of spraying in 1906. The writer first suggested the possibility of controlling this insect with a single spraying at the Boise meeting in 1906, but did not recommend it for the average grower. Since that time, however, practical results in a number of orchards in Utah have warranted its recommenda-

tion, and Professor Melander's experiments in Washington have confirmed this. Professor Melander has also tested dilute solutions of arsenate of lead with good results.

The writer presented this method of spraying to the entomologists of the Eastern United States at their meeting in New York in 1906, with the suggestion that if they would apply the codling moth spray by itself and use the driving method, that they would be far more successful than with the combination spray used at present. Several of the Eastern states have since that time tried this method, and some of them have had very good success. Professor Gossard of Ohio succeeded in obtaining ninety-seven per cent sound in one test with one early spraying. Such, in brief, is the history of the development of our present spraying methods.

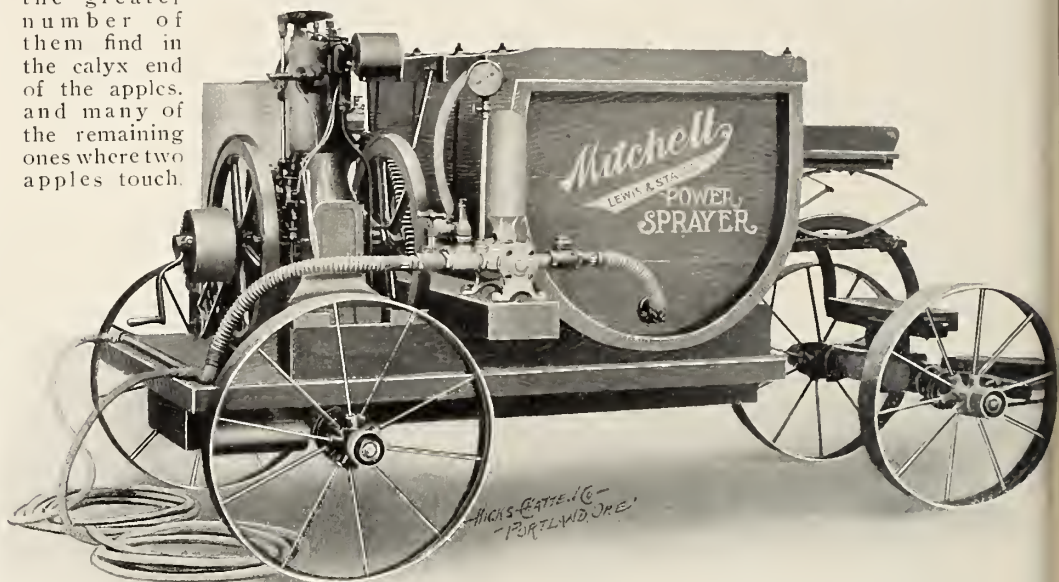
The Method in Detail.

"Nothing short of perfection" is the standard of the Northwest in its production of fruit. "Nothing short of extermination," is its attitude towards the codling moth, and the results of the last few years have shown that it is attaining very close to its ideal in both directions. The method of spraying here advocated is the one that has enabled Western orchardists to attain to their present supremacy, and while some of the details are matters of choice, and good spraying can no doubt be done and fair results obtained even where one or two of the points mentioned are neglected, still experience has taught that it is well for those who wish to do the very best work to modify this practice but little.

The Codling Moth—Better work will always be done where founded on a knowledge of why it is done. No excuse therefore is needed for giving a summary of the insect's life history. The moth is a small shy creature, rarely ever seen, flying only in the dusk of the evening and then with a rapid zig-zag motion hard to follow. In color it resembles the bark of the twigs with white stripes imitating the "bloom" that is always found on growing shoots. The eggs of the first

brood, tiny white specks, are laid on the upper surface of the leaves, close to an apple, rarely ever on the apple itself. The majority of the second brood eggs are laid on the surface of the apples, but not in the calyx end, as formerly supposed. The little worms hatch and break through the top of the egg shell and immediately seek a hiding place, which the greater number of them find in the calyx end of the apples, and many of the remaining ones where two apples touch.

the same way, but are more careful to find a good hiding place, spinning a tough cocoon in which they remain all winter. On account of the fact that the broods overlap and that the second brood continues through a long period, many people have decided that there are more than two broods. But everywhere that it has been carefully investigated



MITCHELL POWER SPRAYER OUTFIT

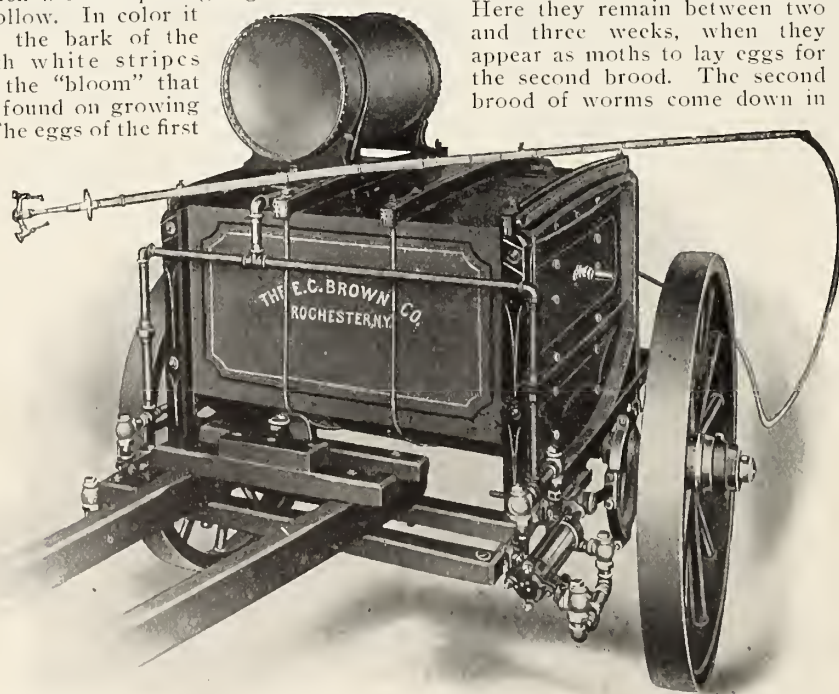
Made by Mitchell, Lewis & Staver Company of Portland. This outfit consists of a low, short-turn goose-neck truck, a round bottom mixture tank, a Myers spray pump and a two-horsepower gasoline engine. It is said that these outfits are giving good satisfaction.

The little worm bores down into the flesh of the apple, those of the first brood going directly to the seeds in most cases. When full grown they bore out on the side of the apple, even where they went in at the calyx end, and crawl down the limb to the trunk of the tree, where they spin a loose cocoon under the bark.

Here they remain between two and three weeks, when they appear as moths to lay eggs for the second brood. The second brood of worms come down in

throughout the larger part of the apple growing region, two broods and two only have been found. The great value of this knowledge lies in the fact that we can figure with absolute certainty that the few worms of the first brood that survive the poison will not produce more than ten to fifteen worms each during the rest of the season, since, as far as we know, a pair of codling moths produce only from forty to fifty eggs, and it will be rare that all of these live to enter the apples. Our problem, therefore, is to kill the largest possible percentage of the first brood, so that there will be very few left to propagate, and to so place the poison that the greater number of their progeny will also be killed.

The Equipment Necessary—Half of the failures in spraying that the writer has observed have been through lack of the proper equipment. It is impossible to get a complete outfit, properly equipped, from very many of our manufacturers, even at the present time. The first essential is a good pump. Only the very largest of the barrel pumps are strong enough for this work. Any of the double acting pumps will furnish pressure enough, and for large orchards the power sprayers have proven their worth. For any of these pumps one-half inch hose is as large as is desirable, and this should be from five to seven-ply, to withstand the heavy pressure necessary. Twenty-five feet of such hose, with an eight or ten-foot bamboo pole, equipped with a cut-off, furnishes sufficient length to enable one to do good work. On the end of the pole should be placed a bend or angle of about forty-five degrees, carrying a flat-spray nozzle of the bor-



TWO-HORSE TRACTION SPRAYER, "AUTO-SPRAY" NO. 23

Capacity 150 gallons. Will spray trees of any kind and size without hand work. Weight, packed for shipment, 900 pounds. C. H. Lilly Company, Portland and Seattle

deaux or Bean double type. With any outfit see that there is a large agitator, so that the mixture is well stirred. With such an outfit small trees can be sprayed from the wagon, or even from the ground, but for the larger trees the tower or ladder is necessary, and any one who has ever used a well-made tower or sprayed from a ladder will never be guilty of going back to the old method. The Bean Company have

same process from the other quarter. By driving up one row and down the next, in this way each tree receives four sprayings, each one of which will cover nearly one-half of the tree. Small trees may be sprayed with one stop on each side.

When to Spray—As soon as the blossoms fall the five green calyx lobes begin to turn up, and in ten or fifteen days have completely closed over the calyx cup. All poison that is to be placed in these cups must be driven in there between these dates. Where two sprayings are given, the first one should

must be driven straight in to reach them at all. If all the calyx cups on a tree closed at one time, there would be one day in which the best spraying could be done, but as the center blossom of a cluster almost always closes before the other, this is not the case. When this blossom is partly closed and in fine shape for spraying the others are wide open. If only one fruit sets it is almost always the center one, but in many cases several of the others will also produce apples, so it is necessary to poison them all. Some advocate the use of the second spray to cover the outside of the apple, but in the writer's work this has been applied in the same way as the first one, with the intention of reaching the calyx cup. Very few of the first brood of worms go in from the surface of the apples, except where they are touching, and where a driving spray is used it will almost always leave a film of poison where two apples touch. It makes no difference at all whether it rains during or after one of these driving sprays. The poison that is placed in the calyx cup cannot be washed out by rain.

The Amount to Apply—It has been found that in practice this kind of spraying requires about two-thirds as many gallons of spray as there are to be bushels of fruit. The question is often asked, "How much can you spray in a day with a given outfit?" a question that cannot be answered in terms of acres, because it depends entirely upon the size of the trees and the amount of blossoms. A barrel pump with one bordeaux nozzle will throw from three hundred to four hundred gallons of spray per day. A double-acting pump with two lines of hose and two nozzles will double this amount, while the gasoline power outfit with four bordeaux nozzles will throw about twice as much from each nozzle as in the case of the hand pump or the double-acting one, on account of the increased pressure, but better work will be done from the power sprayer if only two nozzles are used, and with the double-acting pump if only one. By figuring the amount of apples expected per acre, it will be easy to ascertain how much each style of pump will do in a day. In the writer's experience there has been no difference in the efficiency

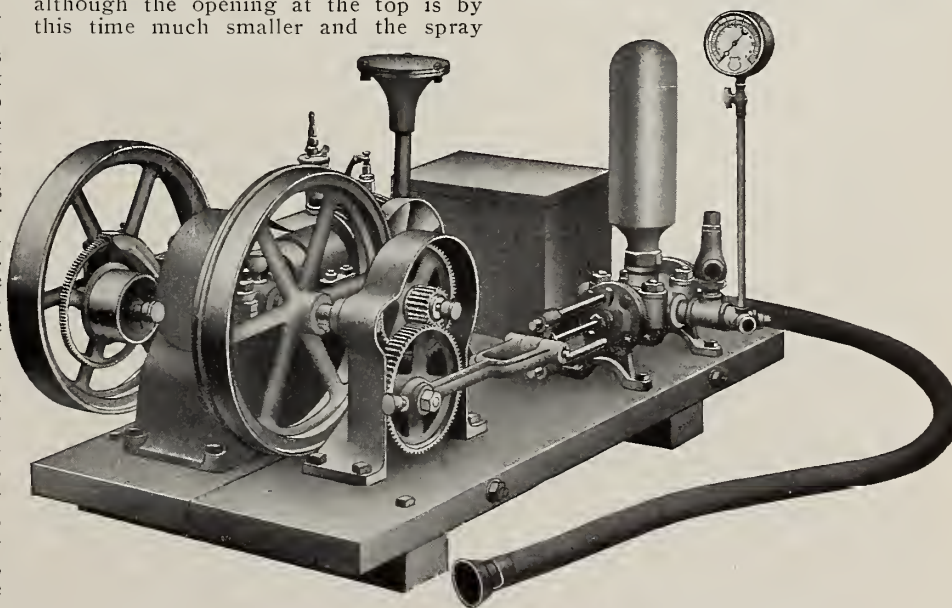
FAIRBANKS-MORSE PORTABLE SPRAYING OUTFIT

Complete with mixture tank, agitator, mounted on wagon trucks, comprising the Fairbanks-Morse two-horsepower vertical evaporator type gasoline engine, with high pressure pump and fittings. The first outfit on the market and still a strong contender for first honors as the most popular sprayer. Fairbanks-Morse, Portland, Oregon, and Chicago, Illinois

made a neat bend especially for this codling moth spraying, and it might be well in this connection to warn people against the smaller types of flat spray nozzles sold under the name of bordeaux that have only one spraying surface, as they are too small for this work. The large-sized bordeaux, with two surfaces, has the name stamped on the handle, while the others do not.

How to Spray—The driving spray, as now used, is applied only to the blossoms, no attention being paid to the leaves, but every calyx cup must be filled with the poison. To do this, the nozzle should be set so as to throw fine drops a distance of six feet before they break into a mist. With one hundred to two hundred pounds of pressure this can be done. Nearly all of the blossoms point upward, a few on the outside of the tree point out, and beneath the branches some point down, always however toward the light. The nozzle should then be passed up and down the limb, holding it within eighteen inches of the blossoms and turning it so that you are sure to drive the spray straight into the top of each one of the calyx cups, continuing until the last one is filled. In practice this is accomplished on large trees by stopping the outfit just before one reaches the tree and spraying all that can be reached from that position, turning the pole in the hands and reaching underneath the tree and spraying up, working up and down on the side, spraying in, and from above driving it down, and even following up and down the large branches inside the head. Then driving on by the tree and repeating the

be put on as soon as possible after the blossoms fall, the second one will follow in about ten days. Strange as it may seem, the more open the cup the harder it is to fill, for if you will look at the blossom end of an apple you will find two cups, one above the stamen bars and one below, and it is into this lower cup that we must drive the poison. When the calyx cup is wide open these stamen bars are thick and fleshy and form a tight roof. Later they shrivel and it is much easier to drive through them, although the opening at the top is by this time much smaller and the spray



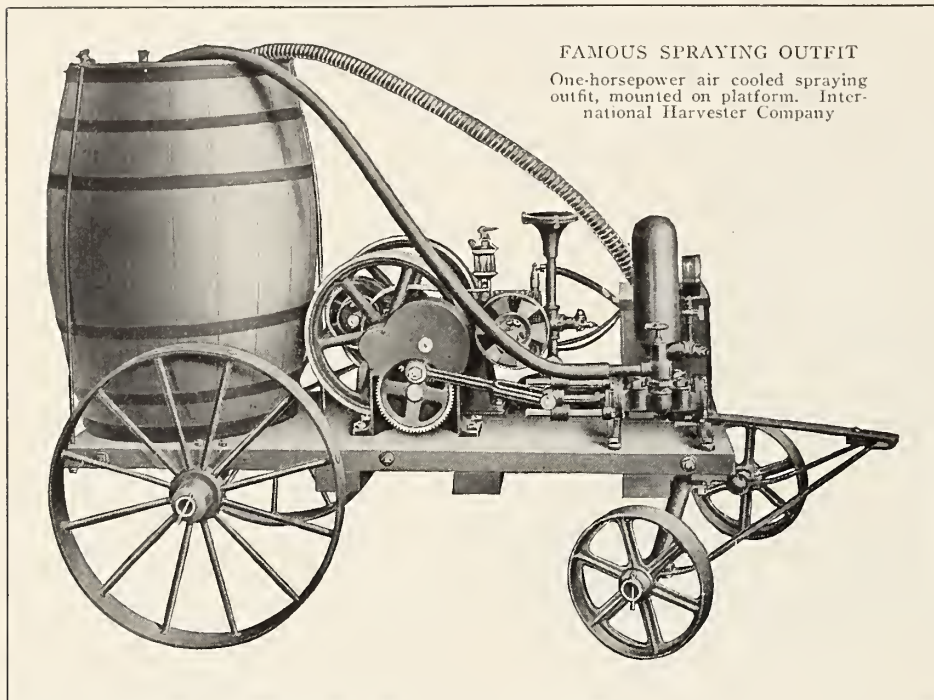
INTERNATIONAL HARVESTER COMPANY SPRAY OUTFIT, CHICAGO
D. McDonald, Local Agent for Hood River

between the hand pump and the power spray. It is entirely a question of thoroughness of application in each case.

How the Worms Are Killed—It has been found, as the result of six years of experimentation, that if a proper amount of poison is placed in the calyx end of

ate of lead side by side under exactly the same conditions, and in none of these experiments was there so much as one-half of one per cent difference in the results obtained. At present the price of the two poisons, and these are practically the only two used at the present

apple with a worm in the calyx end to be found in any one of half a dozen of these orchards, and, so far, has not lost a single dollar. This offer has been published in the papers, and in one orchard the man who bought the crop instructed every picker and packer to watch carefully for the coveted fruit, but not a single one was found.



FAMOUS SPRAYING OUTFIT
One-horsepower air cooled spraying outfit, mounted on platform. International Harvester Company

the apple, that ninety-six or ninety-seven per cent of the worms entering there will be killed, and that at the same time four-fifths of all those entering the sides will also be poisoned, thus reducing the possible second brood to a very small number. As two-thirds or more of the second brood enter the calyx end of the apple, which is still full of poison, they will meet a like fate, and even of those entering the sides a majority will be killed. The success of the spray lies in its power to practically annihilate the first brood of worms; the few remaining will be further reduced by spiders and predaceous insects, thus almost eliminating the second brood.

What Spray to Use—For three years the writer tested paris green and arsen-

time, is about the same. The lead arsenate remains in suspension a little better, while the paris green has the advantage that it can be seen in the calyx cup with the ordinary hand lens, and thus one is able to tell at any time during the season just how thoroughly the spraying was done. The lead arsenate is a little less liable to burn the foliage and to russet the fruit, and should be used in preference where there is danger of repeated rains.

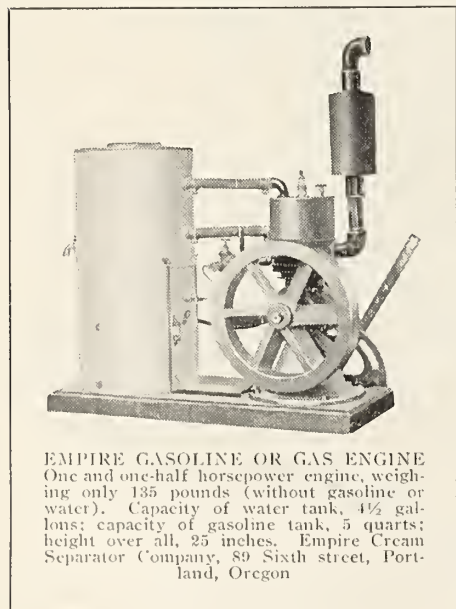
Scraping and Banding—For old orchards that have been neglected it is also well, until the number of worms has been reduced to two or three per cent, to scrape the rough bark from the trunks of the trees and to put on bands of burlap six weeks after the blossoms fall, removing them and killing the worms every ten days from then until the latter part of August, when they may remain until picking time.

The Success of the Method—No method of spraying will bring an old wormy orchard into a satisfactory condition in a single year. But the orchardists who have been using this method for a few years have, many of them, reduced the number of sprayings from three or more to two, and a number of the best and most careful workers have reduced the number of worms to such an extent that they find that one spraying each season practically eliminates the wormy apple. In districts where the codling moth is not as severe as it is in the greater part of Utah, striking results have been obtained the first year of spraying. But when one thinks of the orchards in which there were three and four worms to an apple a few years ago now practically wormless with a single spraying, the contrast is just as striking. For three years now the writer has offered to pay a dollar each for every

BORDEAUX MIXTURE

COMMENT ON ARTICLE IN JANUARY BETTER FRUIT BY C. E. BRADLEY, OF CORVALIS.

IN the January issue of "Better Fruit" it is suggested that sulphate of iron, formed by bordeaux mixture coming in contact with iron fittings of spray tanks, may be a possible explanation of bordeaux injury. It is a fact that when a solution of copper sulphate comes in contact with iron a portion of the copper is precipitated and a corresponding amount of iron dissolved in the form of iron sulphate. The simple experiment of thrusting a knife blade or iron nail into a solution of copper sulphate shows this action—a red coating of copper appearing on the iron. There is no copper sulphate, however, existing as such in bordeaux mixture, but the copper is present as an insoluble basic salt, together with an excess of lime, which renders the solution alkaline. This insoluble copper salt does not react with iron as does copper sulphate, which can be easily verified by immersing a nail in bordeaux mixture, noticing that the nail remains perfectly bright. It is evident that copper is not precipitated from the bordeaux mixture by the iron, and hence iron sulphate is not formed in the solution.



EMPIRE GASOLINE OR GAS ENGINE
One and one-half horsepower engine, weighing only 135 pounds (without gasoline or water). Capacity of water tank, 4½ gallons; capacity of gasoline tank, 5 quarts; height over all, 25 inches. Empire Cream Separator Company, 89 Sixth street, Portland, Oregon



DESCRIPTION—This is our most popular barrel spray pump and is recommended not alone because it is low in price, but because it is unusually effective and develops very great power with little labor. It may be operated all day without fatigue and is warranted to operate four nozzles if required. C. H. Lill Company, agents, Portland, Oregon, and Seattle, Washington

PRACTICAL EXPERIMENTS WITH CODLING MOTHS

BY B. F. HURST, BOISE, IDAHO

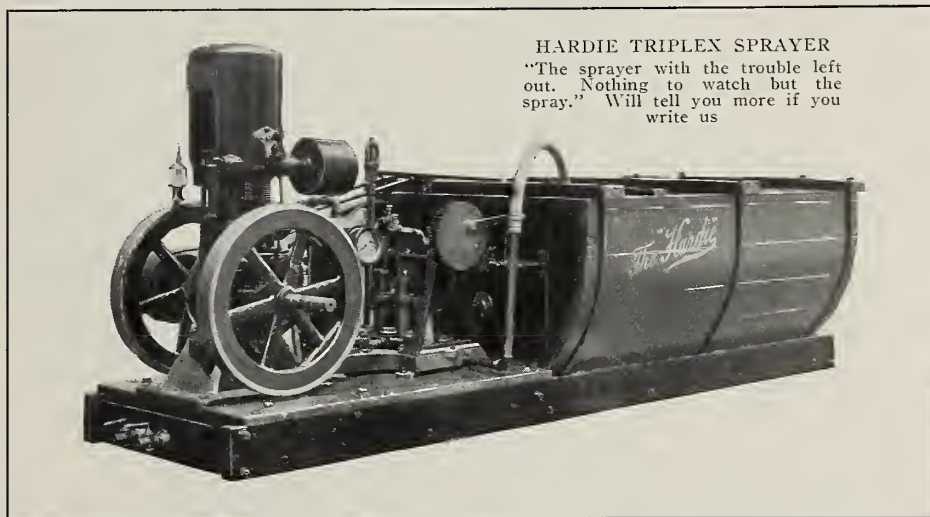
IN my experiments last year there were some things which were strongly disputed by some of the horticulturists of this state, and other experiments, with the results of which I was not entirely satisfied myself; and still other things about which I felt I had just begun to find out the truth, and so was impelled to continue my experiments this year.

I present these results of my experiments feeling that with many of them you cannot held but agree and hoping that while you may not agree with me in all points touched, that my expressing my views may be the means of opening up to all a field for personal investigation, as I feel too few have taken the time to form their own conclusions.

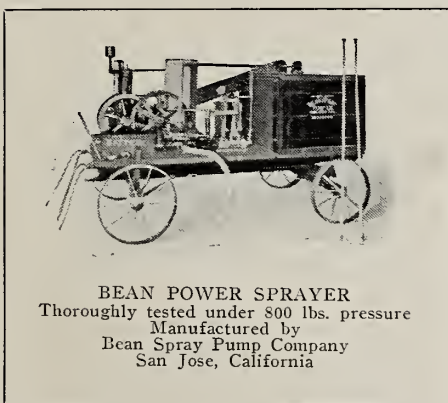
I took six hundred codling moth worms and put them in six hatching cages on the north and south side of a tree about April 10, and the millers began coming out about May 1 and by the tenth they were one-third out, while by May 25 they were all out. I put another hatching cage under the floor of a packing house, and those millers were not all out until July 20. So this proved a thing that I had about decided

apples, although the millers had been out since the 1st of May, and though I watched closely during the whole month I was unable to find an apple being affected by a worm. As we had several

having on them the codling moth eggs. These apples were left on the fruit spur which was broken from the tree and the broken end of it was covered with grafting wax, and then put in water.



HARDIE TRIPLEX SPRAYER
"The sprayer with the trouble left out. Nothing to watch but the spray." Will tell you more if you write us



BEAN POWER SPRAYER
Thoroughly tested under 800 lbs. pressure
Manufactured by
Bean Spray Pump Company
San Jose, California

cold nights during May, the thermometer registering as low as 36 degrees, I began to wonder if that could have affected the codling moth miller. So taking two cages and hatching one hundred millers in each cage, I placed one cage in a temperature of 38 degrees and the other in a temperature of 36 degrees. The millers did not seem to be affected. One of these cages was placed in a temperature of 29 degrees and the other in a temperature of 2 degrees below zero. The millers in the last cage were all frozen and never revived. Those in the other cage revived and seemed quite lively. I came to the conclusion that the cold nights during May did not affect the millers.

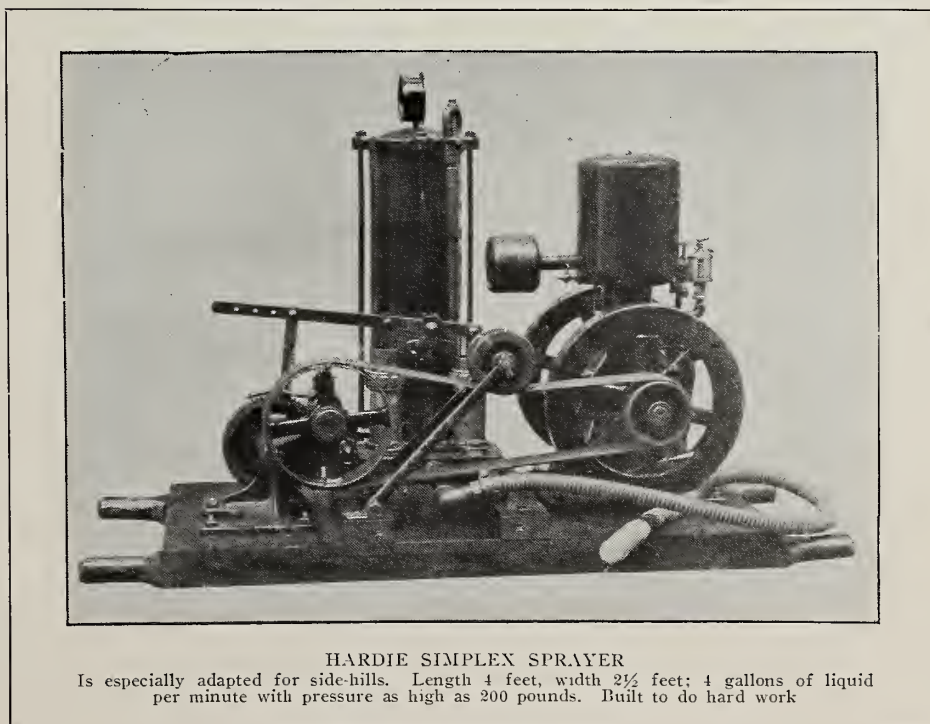
I next, about June 20, selected apples

This kept the leaves and apples green for three weeks. There were about ten eggs on these apples. Some had just been laid and others showed the red circle in the egg. This was put in a temperature of 36 degrees for ten hours, after which the jar was set in the sun to see if the eggs would hatch. Not one ever hatched. I repeated this experiment and had the same results so came to the conclusion that if the temperature goes down to 36 degrees that the egg is chilled and never hatches. This explains why we had no worms going into the apples during the month of May here in the Boise Valley. The last cold night was May 30 and as the first worm I discovered going into an apple was on June 10, it shows most

before; which is, that the time of the appearance of the first moth is governed by climate conditions; the moth coming out much earlier during a dry warm spring than during a rainy, cold one. They may come out under favorable conditions in some localities as early as April 1.

Seeing this condition in the first brood of worms, I took off the second brood about July 20, one hundred worms and one hundred in the pupa stage and put them into two hatching cages, having fifty of each kind in each cage. These cages were put in cold storage at a temperature of 36 degrees and 29 degrees. The cage put in the 29-degree room was taken out September 20 and put on the sunny side of a tree. The weather being warm, I thought some of those in the pupa stage or some of the worms might change to the miller, but they did not and none of those in the pupa stage showed any signs of life, while the worms, when examined thirty days later, were found to be dead. This demonstrates that in a high altitude where they have late springs and early falls there would be but one brood of the codling moth. But all along the Snake River Valley we have two broods.

I was greatly puzzled about the 15th of May to find no worms going into the



HARDIE SIMPLEX SPRAYER
Is especially adapted for side-hills. Length 4 feet, width 2½ feet; 4 gallons of liquid per minute with pressure as high as 200 pounds. Built to do hard work

conclusively that the eggs were chilled during the cold weather in May.

I consider that at least three-fourths of the codling moth eggs were chilled this season and so never hatched, which accounts for there being so many less worms in this valley this year than usual. There were also several cold nights during September and October which lessened the second brood of worms.

My first spraying was done May 10. At this time I counted the leaves on the fruit spurs of several trees and noted their size, and the 10th of June I examined these same clusters of leaves and discovered from one to three full grown leaves had been added to these clusters, and that the other leaves had not grown any. I did the second spraying at this time. I examined the leaves again the 10th of July when I did my third and last spraying. On some of the clusters another new leaf had been added, but I did not find any new leaves added to the cluster of leaves on the

fruit spurs after this time and as the codling moth does not lay the eggs on the leaves of the new growth of the tree, I think that three sprayings are sufficient for the codling moth anywhere in the Snake River Valley.

In order to see just how the worms would eat the leaf, I broke off some fruit spurs with leaves on and also took some water sprouts with leaves on, and putting grafting wax over the cut ends of the limbs, I put the limbs into a bottle of water which was in turn placed in a bucket of water. This was done to keep the worms from getting off of the foliage. By cutting apples I got twenty-five worms from two days to two weeks old and put them all on the foliage. On the full grown leaves on the fruit spurs the worms ate the under part of the leaf just like a slug eats the top of the leaf. On the small tender leaves of the water sprout the worms ate on the top of the leaf, some going in the stem of these tender leaves

and others girdled the tender limbs. These worms remained on this foliage for three weeks, at the end of which time the leaves began to wither and were thrown away, although the worms still seemed in a healthy condition. So you can see I naturally came to the conclusion that in spraying, both top and bottom of the leaf must be covered if the worm was to be killed.

Just to see how much poison it would take to kill a worm, and just what length of time it could be done in, I took an apple and dipped it in the spraying solution made with twenty-five pounds of arsenate of lead and one hundred gallons of water. This left the apple white all over. Tying a string to the stem of the apple and suspending it from a limb, I took twenty-five worms, some of them the smallest I could find and others two or three weeks old, and placed them on the apple. Four of these worms went into the apple to the core. The apple was cut open in five hours after the worms were put on it and all of the worms that had entered it were dead but one. In other experiments with a much weaker solution I had the same results, so I came to the conclusion that if the worm was not killed on the foliage or if the egg was laid on the apple that the worm would ruin the apple before the poison would take effect.

In studying the anatomy of a codling moth worm, I find he is constituted like a great many of our eating insects. He has a crop, a gizzard and a stomach. Any poison taken into the crop does not affect him because of the lack of moisture in the crop, but when it reaches the stomach it will take effect and so kill the worm. I think this often accounts for the worms not being affected by the poison he has eaten on the outside of the apple until he has reached the core. If the foliage is well covered both top and bottom all worms hatching on the foliage will be killed by it before they reach the apple.

On four different trees I inserted the poison into the calyx of the apples with a small atomizer just as the stamens began to die in the flower, using six pounds of arsenate of lead to one hundred gallons of water, being careful not to let the poison touch any of the leaves on the tree. All worms going into the calyx were killed, but the apples were 50 per cent wormy on these trees and many of the apples had two worms which had gone into the side of the apple. In watching carefully where the worms of the first brood entered the apples this year, I found that there were 75 per cent of the worms entered the apple on the side. I attribute this to the fact that the worms came so much later this year than usual and of course the apples were larger when the worms started to go into them, as I found that in a small apple the worms usually try to enter the calyx, but in a large apple they choose the side for an entrance.

In our seventy-acre orchard I sprayed twenty trees once, twenty others twice, and all the others three times. The trees that were sprayed once and twice were well scattered over the orchard. Some of the trees that I sprayed but once had as high as twenty worm marked apples on them. The tree that I found to be the worst of those that had been sprayed twice had fourteen worms, while I did not find any tree in



TEN STRAWBERRIES TO THE BASKET, SPOKANE VALLEY, WASHINGTON, ADJOINING VERA IRRIGATED TRACTS

the whole seventy acres that had been sprayed three times that had over twelve worms on it, and they did not average five worms to the tree. I consider my loss from worms not over one-half per cent.

I cannot attribute this all to the spraying because the trees were gone over early in the season and all the rough bark removed, which killed a great many worms on the body of the tree, and also I used the tree tanglefoot on every tree in the orchard, which caught most all of the first brood of worms that entered the apples, thus leaving a very few from which a second brood could come.

To prove conclusively whether all the worms come down the tree or if a portion come down their spinnerette to the ground and then come up the tree, as held by some prominent horticulturists, I selected three trees in a badly infected orchard which has not been sprayed for twenty years for codling moth. These trees would average thirty boxes of apples to the tree. Tanglefoot was put around the body of one tree, just below the limbs, one foot wide and one-sixteenth of an inch thick, space being left for a cloth band, another tanglefoot band same width and thickness was applied. Then three cloth bands were put below this tanglefoot band. On the first tanglefoot band at the top near the limbs there were 637 worms caught. There were no worms caught on the cloth band between the two tanglefoot bands and no worms on the second tanglefoot band. There were three worms on the next cloth band, five on the next and eight worms on the bottom band, which shows that sixteen came up from the ground and 637 came down the tree. I scattered rags on the ground around the tree to see if any worms would take refuge in them. I caught ten in these rags. There were 316 wormy apples picked off the ground. It looks very reasonable to me to suppose that the sixteen worms from under the bands and the ten worms from the rags came out of the apples after they had fallen to the ground, especially as I found several apples lying on the ground in which there were worms. On the next tree a tanglefoot band same width and thickness was put around the tree close to the limbs and then three cloth bands and another tanglefoot band at the bottom of the tree, while a cloth band was laid on the ground around the tree. I caught 704 worms on the top tanglefoot band. No worms on the three cloth bands between the two tanglefoot bands, and no worms on the lower tanglefoot band, while twenty-six worms were in the rag laid on the ground around the root of the tree. Quite a number of apples were on the ground around the tree. On the third tree I put a cloth at the top just below the limbs, then a tanglefoot band one foot wide and one-sixteenth of an inch thick, then a cloth band, another tanglefoot band, and four cloth bands from that to the ground. I caught 540 worms in the cloth band at the top, seventy-six in the first tanglefoot band, no worms in the next cloth band or tanglefoot band. In the next cloth band five worms, next two worms, next six worms, and the next ten worms. There were about five hundred wormy apples on the ground around the tree.



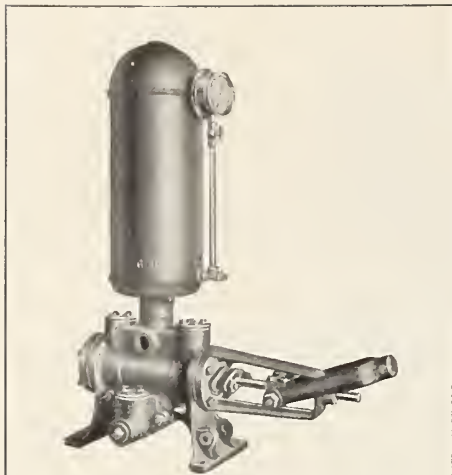
FIVE-YEAR-OLD
WHICH PRODUCES
SIX BOXES
WAGNER APPLES
ADJOINING VERA

FOUR-YEAR-OLD
WHICH PRODUCES
TEN BOXES PEACHES
ADJOINING VERA
SPOKANE VALLEY
WASHINGTON



I put seven cloth bands around another tree about eight inches apart. I caught 625 worms under these bands and they were almost evenly distributed under the seven bands, there being just a few more under the top one than any other. I took twenty worms that were caught under a band and placed them on the ends of three big limbs of a plum tree late in the evening. The next morning all of my worms were caught under the two bands which I had placed on each of these limbs near the body of

the tree. I took sixteen worms from under a band and distributed on the ground around an apple tree within a radius of five feet from the trunk of the tree. In two weeks I had caught four worms under the bands around the tree. I examined the ground at the base of the tree but could not find any worms. I repeated this experiment by taking one hundred worms and distributing them around the tree within a radius of six feet. Then I put six bands around the tree from the ground up into the limbs.



GOULD'S VICE ADMIRAL SPRAYER
Double-acting pump, with horizontal cylinder, for connection to gasoline engine. Portland Seed Company, Portland, Oregon, Agents

The second day I found three worms on the first band near the ground and one worm under the third band. The next day I found two worms under the first band, one worm under the second band, one worm under the fourth band and two worms under the fifth band. The fourth day I found one worm under the first band. The fifth day I found two worms under the first band. The eighth day I found three worms under the first band, three under the second band and one under the fifth band. On the ninth day I found one under the first band and one under the fourth band. I did not look again until the thirtieth day, when I found three worms under the first band and one worm under the sixth band. So you see practically only one-fourth of the worms ever reached the tree.

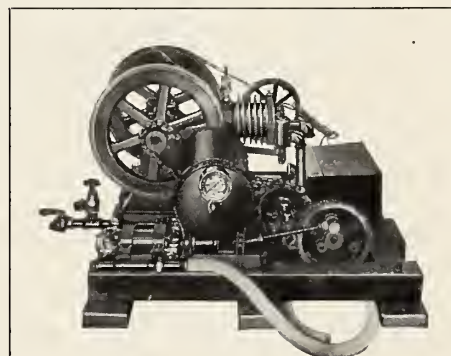
As a result of all these experiments, I can come to no other conclusion than that all worms that come out of the

apples on the tree will come down the limb and trunk of the tree to hunt a hiding place, and that the only ones that are ever found going up the tree are those that have come out of the apples that have fallen.

I discovered that the large red ant will kill the codling moth worm in day time if the worm is not hid; but the worms come out of the apples at night and can usually find a hiding place before daylight comes, so the ant does not destroy them very much.

I believe that a codling moth worm cannot see in daylight for if you suspend an apple by a cord and put worms on it in daytime they are continually standing up and trying to reach some object above them; and in visiting the trees with tanglefoot on, just at the break of day, I have seen many worms on the body of the tree just above the tanglefoot hunting a hiding place, but I never saw this in daytime.

If you have read this part of my experiments carefully you will notice that a worm has never crossed the tanglefoot band, but that they often crossed several cloth bands before they

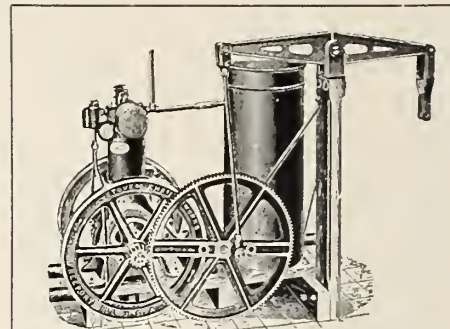


WALLACE POWER SPRAYERS
For orchard, vineyard, field and garden. All sizes and styles. Wallace Machinery Company, Champaign, Illinois, and Spokane, Washington

hid under one. So you see that by putting one cloth band around the tree you cannot be at all sure that you have caught all the worms that come down the tree.

In my own orchard, where the tanglefoot was put on only four inches wide and not one-sixteenth of an inch thick, some of the worms were able to cross the tanglefoot band. I think the tanglefoot should be put on very early in the spring, say about the first of April or May, and should be put at least eight inches wide and one-sixth of an inch thick, or just as thick as it will stay without running down the tree. The reason I advise applying this so early is because if it is done at this time it will also prevent woolly aphis and ants from getting up the tree and you will never have any green, purple or brown aphis, as the aphis do not seem to be able to live without the ants. This has been proven beyond a question in our own and other orchards in this valley during this past season.

The ants pick the aphis up and carry them all over the tree and by sucking out their honey tubes keep the aphis in good health. You never see a tree badly affected with aphis without ants. If you put the tanglefoot around the tree and thus keep the ants from the aphis in a short time there are no aphis

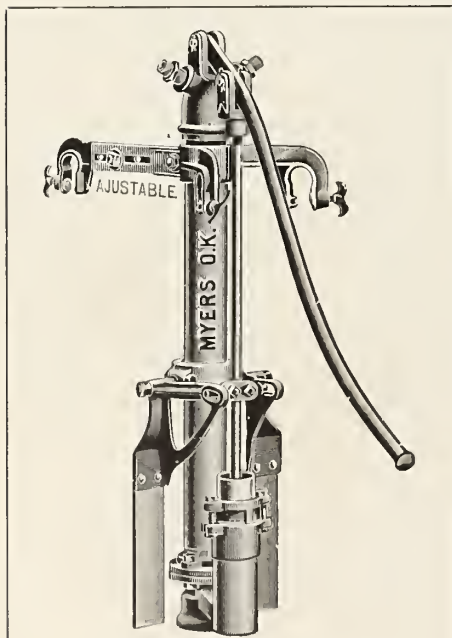


STOVER PUMPING ENGINE

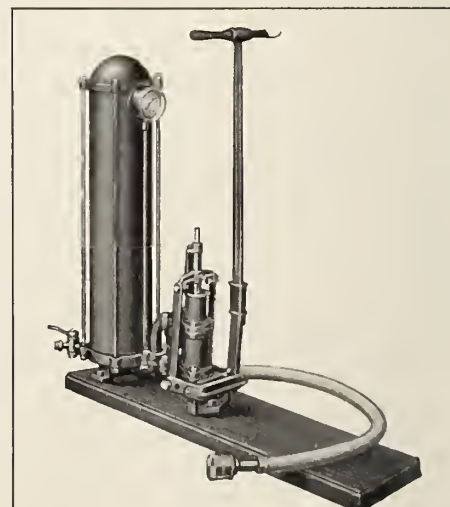
The Stover pumping engine is the regular two-horsepower model with pumping jack attached. It will raise 1,800 gallons of water an hour to an elevation of 100 feet at a cost of three cents. The engine can be disconnected from the pumping attachment and used for all purposes requiring two horsepower. Mitchell, Lewis & Staver Company, Seattle, Spokane, Boise, Portland

on the tree. Last year we lost over seven hundred boxes of apples from the effects of the purple aphis, while this year, by using the tanglefoot, our apples showed no sign of aphis. The woolly aphis come up the tree very early in the spring, but they being just the color of the bark you cannot detect them without the aid of a glass. In many cases they go to the very top of the tree, working on the new growth and cut places on the tree. The young woolly aphis begin to go down the tree as soon as it begins to get warm, about June 15. The winged form comes about September 15. They fly, settle and begin to produce living young on all fruit trees and this explains how young nursery trees are often badly affected by them. Any tree, big or little, that has tanglefoot around the body of the tree, unless already affected by the woolly aphis, can never have woolly aphis on its roots. Several fruit growers in this valley have tried the tanglefoot on the young trees and have found it a sure preventive from green and woolly aphis.

This year I did not get the tree tanglefoot on some of my trees which were badly affected by the woolly aphis until June 1, and so just caught the



MYERS O. K. BARREL SPRAY PUMP
With agitator. "One of the finest" Mitchell, Lewis & Staver Company Portland, Oregon



"SAMSON" SPRAY PUMP

Powerful double-acting spray pump with enormous leverage, capable of maintaining 150 pounds pressure. All brass working parts. Manufactured by The Deming Company, Salem, Ohio



"CAPTAIN" BARREL SPRAYER
Has working parts of brass; special adjustable barrel clamp; low priced; good all over
Manufactured by The Denning Company
Salem, Ohio

young woolly aphids as they were coming down. Two inches at the top of tangle-foot band was a solid mass of woolly aphids. These trees being examined the first of December, there could not be found any woolly aphids below the tanglefoot, either on the trunks or roots of the tree.

I have always thought, as many other horticulturists have, that the woolly aphids bore their young on the roots of the trees, but after this year's experience I have come to the conclusion that the young are born when they go up in the spring and that the young ones go down in June and work during the fall and winter on the roots of the tree. I have found that where the trunk of a small tree is completely covered from the limbs down to three inches below the top of the ground, the mice and

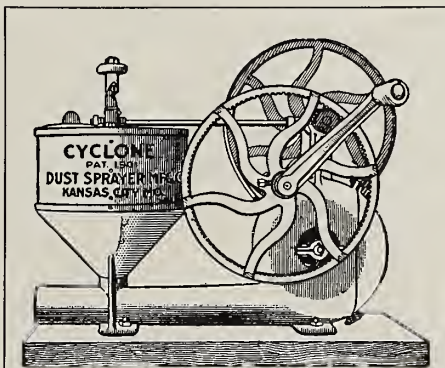
rabbits will not girdle the tree and no aphids or apple tree borer will attack the tree.

I have found the arsenate of lead to be the most satisfactory spray to use, not only because of its lasting qualities (as it remains on the leaves until they drop), but also because, though the tree be sprayed until the spray drips off there is no fear of burning the foliage. In many cases where the arsenate of soda was used I have seen the foliage and apples very badly burned from it.

The analysis of arsenate of soda is:
White arsenic, one pound; hip soda, four pounds; water, one gallon.

This is soluble and if it is sprayed into the tree will burn all the foliage, but by adding twenty-four pounds of lime it becomes insoluble and after the water evaporates it becomes a powder on the leaf. This blows off or the rain may wash it off.

The analysis of London purple is:
Moisture, 3.27 per cent; arsenious oxide, 41.44 per cent; lime, 24.32 per cent; iron alumina, 3.37 per cent; sulphuric acid, .31 per cent; dye of difference, 27.29 per cent.



CYCLONE DUST SPRAYER
The best sprayer made. Manufactured by the Dust Sprayer Manufacturing Company
Kansas City, Missouri

The analysis of paris green is:

Moisture, .74 per cent; arsenious oxide, 68.82 per cent; copper oxide, 30.59 per cent.

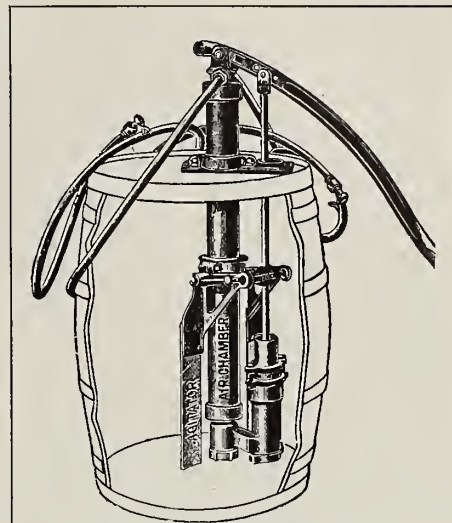
Both the London purple and the paris green are insoluble, and after the water evaporates they are just a powder on the leaf. In all three of these formulas the poison does not evaporate, but it does become a powder which the winds may blow away or the rains wash off.

The formula of the arsenate of lead:

Arsenate of soda, 4 ounces; arsenate of lead, 11 ounces.

This can be used most any strength without fear of burning the foliage, and it remains on the leaf the entire season in a moist state, and so cannot be affected by wind or rain.

I have found the best way of mixing the arsenate of lead to be, after opening the head of the keg, add from one-half to one gallon of water and take a large-sized egg-beater, about eighteen inches long, made of wire and shaped like a baseball bat (they can be got from a hardware or racket store) and commence working the egg-beater up and down in the keg. In about ten or fifteen minutes you can have all the arsenate of lead worked into a smooth batter. When you are ready to use it, take out

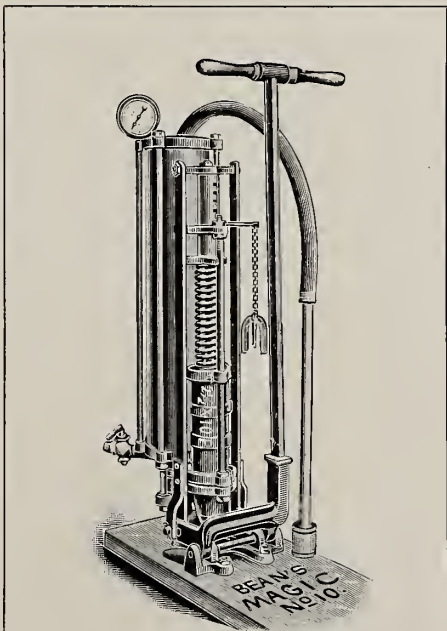


GOULD'S POMONA BARREL PUMP
J. R. Nicklesen, agent, Hood River, Oregon

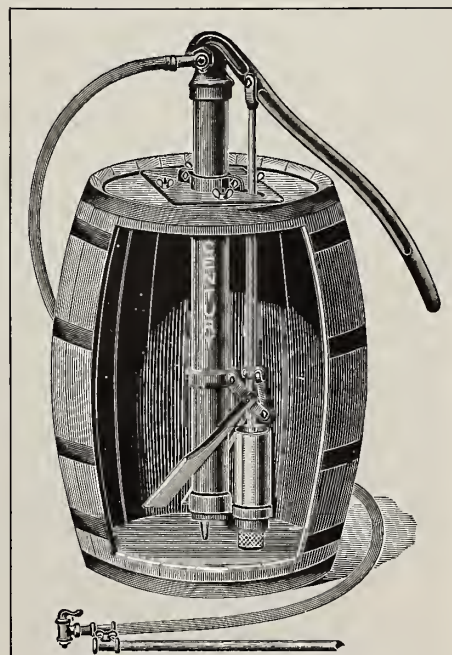
the amount you expect to use and dilute with three times the amount of water, stirring it with the egg beater for about five minutes. It will then be thoroughly dissolved and is ready to be diluted to the proper strength. Be sure to keep your agitator running all the time you are spraying, as the arsenate of lead settles very rapidly.

I have made some improvements in my method of handling the lime and sulphur spray.

First, I have a pump in the ditch, by which I force the water from the ditch into the warming tank. This warming tank is one in which 250 gallons of water is heated to close to the boiling point, with which each fifty gallons of the mixture cooked in the barrels is diluted. We find that if the water is warm the excess of lime will not settle so rapidly. Another pump forces the water from the heating tank into a trough running past the barrels (where we do our cooking) to the supply tank. These pumps are

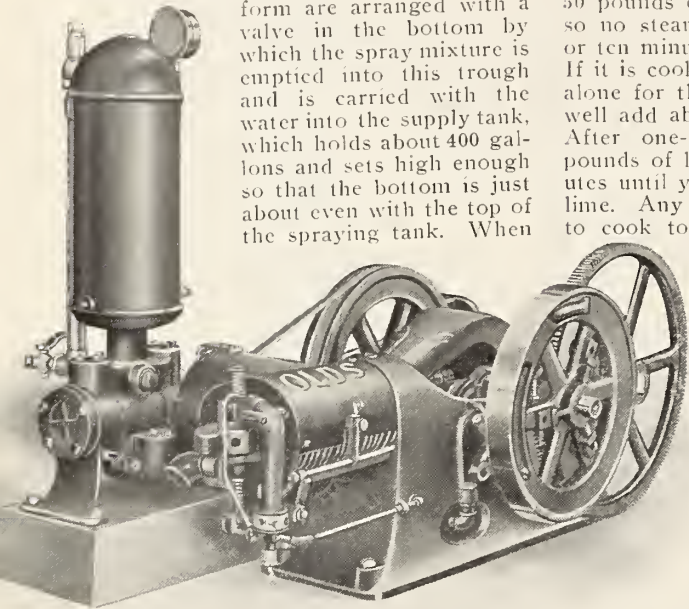


BEAN'S MAGIC SPRAY PUMP
Bean Spray Pump Company
San Jose, California
And J. R. Nicklesen, Hood River



CENTURY BARREL SPRAYER
C. F. Sumner, agent for Hood River, Oregon

made after the fashion of the old-fashioned boat pumps and are more satisfactory than anything else we have seen. The barrels on this ten-foot high platform are arranged with a valve in the bottom by which the spray mixture is emptied into this trough and is carried with the water into the supply tank, which holds about 400 gallons and sets high enough so that the bottom is just about even with the top of the spraying tank. When



VICE-ADMIRAL ATTACHED TO GAS ENGINE
Portland Seed Company, Agents, Portland, Oregon

the supply tank reaches the pump in the orchard, the spray mixture is drawn off through a pipe in such a manner that the spraying is not hindered, it taking just about three minutes to empty the supply tank. We find this is a much more economical way of doing than to stop the spraying and go back with the spraying tank and pump to the cooking platform each time. Thus we keep all the men busy all the time.

The most particular part about the cooking is in handling the sulphur. First, it should be run through a fine screen to do away with the lumps found in some of the best brands. Put about two gallons of water into the barrel and add 75 pounds of sulphur. Take a maul made of a piece of plank 4x12, rounded at the corners, and with a handle put in like a churn dasher, and pound the sulphur down into the water. Use a long-handled spade and spade it up. Pound

down about twice more with the maul, by which time it will be thoroughly dampened, and you can add 24 gallons of water. After a thorough stirring, add 50 pounds of lime and cover the barrel, so no steam can escape. In about five or ten minutes stir this very thoroughly. If it is cooking nicely, recover and leave alone for thirty minutes; if not cooking well add about 10 pounds more of lime. After one-half hour you can add 10 pounds of lime every ten or fifteen minutes until you have added 100 pounds of lime. Any time that the mixture begins to cook too rapidly and undertakes to run over the top of the barrel it may be stopped by adding cold water.

I have been able to make the spray cooked in this manner much stronger than any recorded cooked by the old method. The highest record attained by the old way of cooking contained 29 per cent of soluble sulphur, while that I cooked in the barrel, using 75 pounds of sulphur and 100 pounds of lime, when analyzed by the state chemist showed 30.8 per cent of soluble sulphur. When the sulphur was not dampened first, as spoken of before, but was put in dry after the water

was boiling (as people usually have done before this year), even though the batch was cooked for three hours a great loss was noticeable, as when it was analyzed it was found to contain only 21 per cent of soluble sulphur. The sulphur which remained in this mixture undissolved was screened out and weighed, and found to be 25 pounds after it was dry. By this, it can be seen that from one-fourth to one-third of the sulphur is lost when it is not thoroughly dampened with a small amount of cold water before it reaches any heat or any great quantity of water. This method of cooking the spray only costs one and one-fourth cents a gallon. This spray when diluted showed an analysis of 3 per cent sulphur and 2 per cent lime, which is plenty strong enough to kill the scale. Thirty pounds of salt should be used in the mixture, as it gives a chance to get a heavier coating of spray on the tree, and this prevents other insects from working on the tree during the summer, as the salt causes the lime to adhere to the tree.

You can buy Rex lime and sulphur which, undiluted, will be about equal strength to this, undiluted, but if you use Rex spray it should be about 1 per cent stronger in soluble sulphur than the spray cooked this way, because when diluted with water the Rex has no body and is thin as water, while this, cooked as here described, has both lime and salt to thicken it and give it body, and so much more of it remains on the tree than does of the Rex.

I used this last year, to do this spraying, a two-horse gasoline engine with a pressure of 150 to 200 pounds. Connected to the

pump is a sixteen-foot length of gaspipe which sticks out at the back of the wagon. The farther end of this pipe is kept from resting on the ground by two 16-inch wheels. To the end of this rod is attached two 50-foot 4-ply rubber hose, which are tipped with 10-foot aluminum rods, each having a half-circle nozzle, not a Y.

The object in using this 16-foot rod is to carry the spray away from the gasoline engine, as I found much of my trouble with a gasoline engine was traceable to the fact that the gasoline engine would suck the spray, and thus I would soon have water in my gasoline tank. After this connection was made I had no more trouble with the engine.

The application of spray is always a troublesome proposition to contemplate and operate. I feel, however, that in a measure some of our troubles have been eliminated. There was a new apparatus exhibited at the Idaho Intermountain Fair this fall that appears to have done away with the most objectionable features of spray apparatus. It is called the Pumpless Steam Sprayer, and it is a marvel of simplicity and efficiency. It applies the steam pressure directly to the spray liquid in a pressure tank. A hollow metal float is interposed between



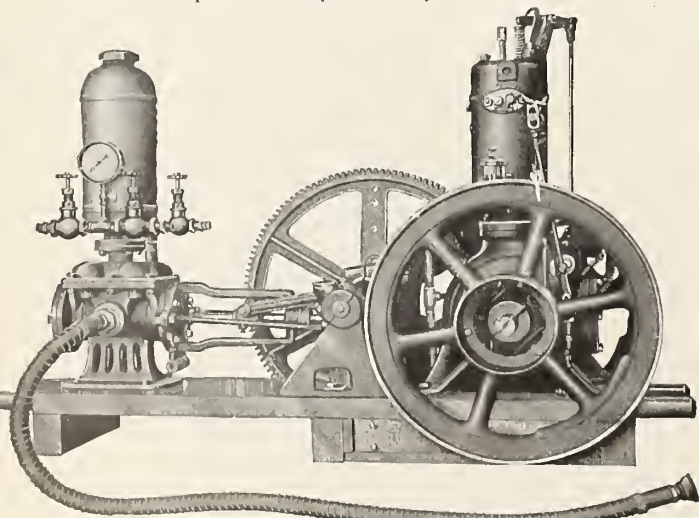
WALLACE "INVINCIBLE" POWER SPRAYER
Wallace Machinery Company, Champaign, Illinois,
and Spokane, Washington

the steam and spray liquid to prevent the condensation of the steam and make the steam pressure effective.

I witnessed a demonstration of the apparatus recently. I saw a fire built in a vertical steam boiler of three-quarters horsepower. The steam then expelled the air in the spray tank (a range boiler of 63 gallons capacity), a vacuum being thereby created and the dip drawn in by suction from the tank in less than two minutes. As the dip entered the tank the float was raised to the top and steam was then applied, and in less than forty seconds it showed a pressure on the spraying gauge greater than the steam pressure.

We opened four nozzles and later took off the spray pipes, leaving the hose wide open; the pressure remained constant the whole time and it was the most effective spray I have ever seen. When the tank was emptied the steam under pressure was exhausted and the balance of the steam condensed, and we again had our vacuum and refilled.

The apparatus is being manufactured and will be marketed for this next spraying season. The makers will guarantee their machine to apply 3,000 gallons in ten hours, through four nozzles, at full pressure. The machine will weigh inside of 1,000 pounds. It will have a 300-pound test, and will sell for about \$300 in galvanized steel, or proportionately greater in copper.



FAIRBANKS-MORSE TWO-HORSEPOWER GASOLINE ENGINE
Direct connected to the Fairbanks-Morse special spray "Mist" 2 1/2x5 double-acting spraying pump. This is one of the best and most efficient outfits on the market. Fairbanks-Morse, Chicago, Illinois, and Portland, Oregon

SOME RECENT WORK ON BORDEAUX MIXTURE

BY PROFESSOR C. E. BRADLEY, OREGON AGRICULTURAL COLLEGE, CORVALLIS, OREGON

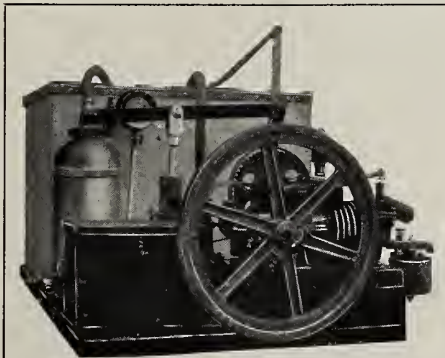
BORDEAUX MIXTURE has been used as a fungicide since 1883, and like many useful preparations its value was only discovered by accident. Near the town of Bordeaux, France, certain vineyards by the roadside were sprinkled with verdigris to give them the appearance of having been poisoned, in order to prevent depredation. A mixture of copper sulphate and lime was finally used in place of the verdigris for this purpose. When the downy mildew made its appearance in these vineyards it was noticed that the vines which had been sprinkled with lime and vitriol were free from the disease, and the value of the mixture as a fungicide was thus discovered.

Literature relating to bordeaux mixture, its composition, theory of its action and explanation of the injury resulting from its use, is very extensive. From time to time many papers have appeared in Germany, France, England and our

colored products may be formed in this process, depending upon the amount of lime used, and the strength of the solutions. Spencer Umyreville Pickering director of the Woburn Experimental farm, England, in a recent research has shown that basic sulphates of copper are formed when lime and vitriol are mixed, as in the bordeaux preparation, the composition of the product varying with the proportion of lime added. If just sufficient lime is added to precipitate all the copper, that is one part of lime to five parts of copper sulphate, a light blue compound is formed which settles quite rapidly. When lime is added in sufficient amount to render the solution temporarily alkaline, another basic sulphate of copper is formed of somewhat darker blue than the first product, and settling very slowly. If lime is added until the mixture is permanently alkaline a third product results, of very dark blue color and settling somewhat more rapidly than the latter mentioned product. If lime is added in the proportion of one to one, as in ordinary bordeaux, the product consists of double basic sulphates of copper and lime.

Regarding the principle on which bordeaux acts, it is shown by Pickering that the insoluble sediment is slowly acted upon by carbonic acid of the air, forming small amounts of soluble copper sulphate, to which the fungicidal action is due. The process may be illustrated by the following experiment: If a sample of bordeaux made with a slight excess of lime be exposed to the air in a flat dish and allowed to repeatedly evaporate to dryness, moistening with rain water after each evaporation, in the course of a few days appreciable amounts of copper can be detected in the mixture. Alternate rain and sunshine thus give conditions in the field which may cause the formation of excessive amounts of soluble copper that will result in injury to leaves and fruit. The slowness of the process by which the copper is rendered soluble is due to the presence of excess of lime, which has to be converted into the carbonate form and the basic sulphates of lime decomposed before reaction commences upon the copper. In a one to one mixture of bordeaux five times as much lime is present as is required for precipitating the copper, and hence fungicidal action is retarded. Dr. Pickering shows that a mixture containing five times as much

lime as copper sulphate is valueless as a fungicide. According to him, if just enough lime to precipitate the copper be



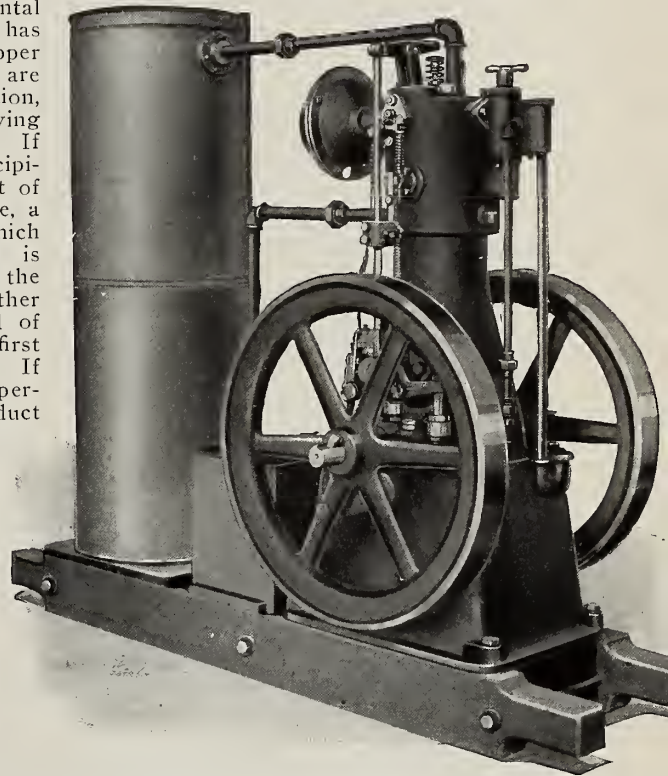
PACIFIC POWER SPRAYER

Maintains pressure up to 250 pounds or less. One horse can handle it on a sled or truck. Adjustable capacity for two, five or six nozzles. Manufactured by Reiersen Machinery Company, Portland, Oregon

own country on this important fungicide which present varied and conflicting opinions concerning its composition and principle of action. It is remarkable, however, that with all the work which has been done on bordeaux mixture its true composition has not been until lately established.

Soluble copper compounds, it is well known, are very poisonous to both higher and lower forms of plants. One part of copper in twenty-five million of water acts injuriously on water cultures of the peach, and one part of copper in seven hundred million of water is fatal to wheat seedlings. It was natural to suppose that the active principle of bordeaux rested in the copper compound, as applications of lime did not prove of value. On the other hand, injury results from the use of the copper salt alone.

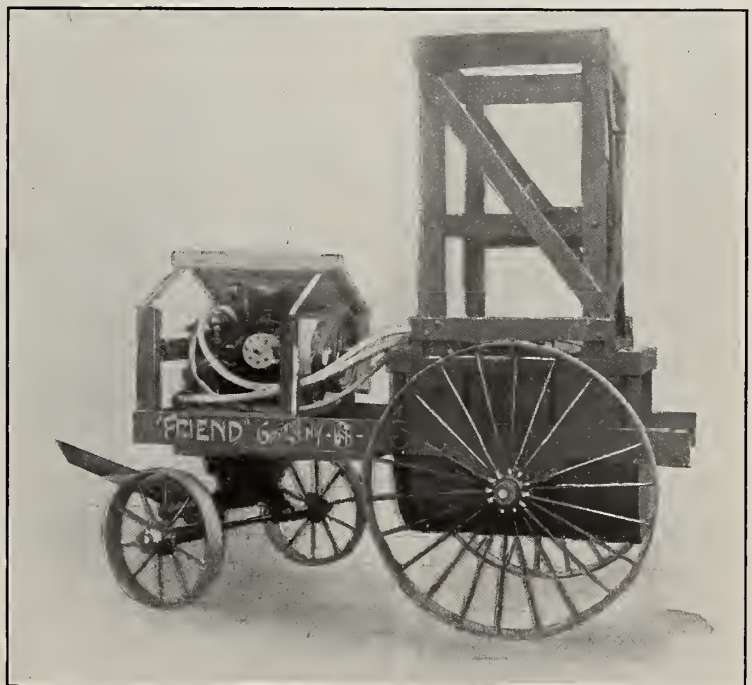
It was originally thought that the products formed by mixing the ingredients of bordeaux consisted of hydrate of copper, and sulphate of lime containing some slacked or hydrate of lime when lime was used in excess. This excess of slacked lime was known to be converted after spraying into carbonate of lime by the carbonic acid in the air. That the reactions taking place in preparation of bordeaux mixture are not definite and invariable, however, is indicated by the fact that various



THE ALAMO ENGINE

A modern distillate engine for irrigating, spraying and farm work. Special portable engines for hay press duty Beeman-Woodward Company, 71 Front Street Portland, Oregon

added, a mixture is obtained which has immediate fungicidal action. Such a mixture would be more efficacious than normal bordeaux, i. e., capable of furnishing more copper sulphate on decomposition by carbonic acid, though actually containing less than one-half the copper



FRIEND NEW COMBINATION 1909 MODEL

Manufactured by Friend Manufacturing Company, Gasport, New York Especially adapted for hilly orchards

sulphate of the normal mixture, and hence cheaper in that proportion. It is advised that the mixture be prepared by adding to a solution of copper sul-

phate. A test should be made with potassium ferro cyanide solution to make sure that the copper is all precipitated. It may be added here that a safe

cyanide solution to the mixture does not reveal it. This method of making bordeaux is said to have been used extensively in Italy for grapes, 1.6 pounds of copper sulphate being mixed with 25 gallons of lime water. The use of lime water might possibly necessitate more inconvenience in preparation, but would have the advantage of forming a mixture free from lumps.

While it is not recommended by the writer that growers experiment exten-

sively with bordeaux prepared by the above method, it might be tried on a small scale, and conditions may arise wherein it might prove of advantage to have a mixture capable of exerting immediate fungicidal action.

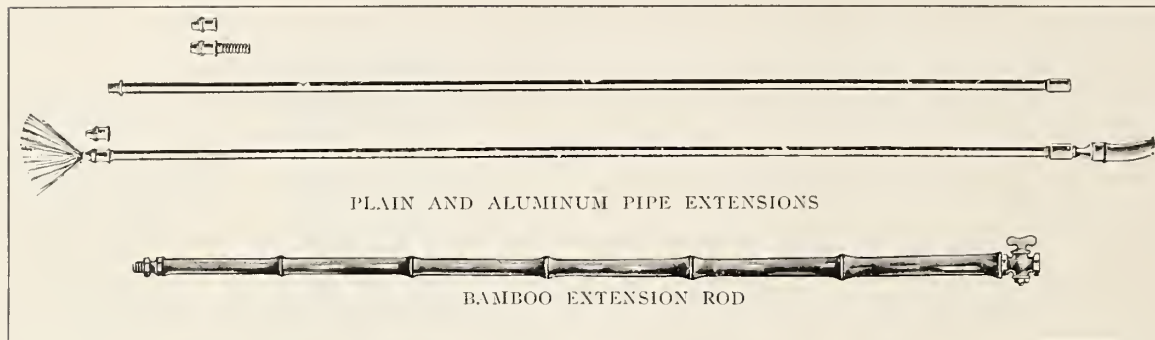


plate containing one pound to each gallon of water, thirteen and one-half gallons of clear saturated lime water. Pouring the copper sulphate into the lime water is considered by some authorities to be a better method of

way to test bordeaux for soluble copper is to add some of the mixture to a few drops of the ferro cyanide solution in a white dish, the red color of soluble copper developing under these conditions when an addition of the ferro



WALLACE FIELD SPRAYER AT WORK

Manufactured by Wallace Machinery Company, Champaign, Illinois, and Spokane, Washington. *The Dandelion Pest*—Young dandelion plants are killed by spraying with a 20 per cent solution of sulphate of iron. Old plants are badly injured, the foliage being wholly destroyed, but the growing bud is not killed and the old root sends up new foliage. Applying dry sulphate of iron to the "heart" (growing bud) of the old plant produces death. Repeated spraying of middle aged and old plants results in their death. To destroy young dandelion plants by spraying, dissolve two pounds of sulphate of iron in a gallon of water, stirring with a stick to hasten solution, and apply with a hand sprayer. Use one gallon of the solution to one square rod of grass plot. If the first application is not completely successful, spray a second time. Repeated spraying will be rewarded by the eradication of the plant. The grass and clover will be blackened and appear killed, but this need cause no alarm; they are not mortally injured and in a few days recover and grow with increased vigor.

LIME-SULPHUR SPRAY PREVENTIVE OF APPLE SCAB

BY A. B. CORDLEY, DEAN OF THE SCHOOL OF AGRICULTURE, AGRICULTURAL COLLEGE, CORVALLIS, OREGON

IN the Oregon Agriculturist of March 1, the Rural New Yorker of March 7, and "Better Fruit" of September, 1908, I published brief articles with the above title, in which I called attention to some interesting results which had been obtained in preventing apple scab

better results in controlling scab but had also the added advantage that it produced no "spray injury" to the fruit. At the same time I stated that "sufficient work has not been done to justify the statement that lime-sulphur is equal to Bordeaux as a preventive of this disease, but the results of the single season's work point so strongly to this conclusion that I feel justified in calling attention to them, that growers who have suffered loss from bordeaux injury, and others who are interested, may make comparative tests of the two sprays the coming season."

The suggestion seems to have met with a ready response. Not only did many growers use lime-sulphur when spraying for scab last spring, but both the Washington and Idaho Experiment Stations also tested it. The Washington station reports exceedingly satisfactory results, while Idaho tests were rendered inconclusive by the general scarcity of scab. The results obtained by growers were variable, but enough interest had been aroused in the method, both here and in other portions of the country, to justify a further statement of the results obtained during the past season.

Lime-Sulphur Solutions

Since the work of 1908 was based upon that of 1907, it seems advisable to repeat some of the statements which were made in the above mentioned article.

"In carrying out the work of the past season (1907), it became necessary first of all to determine how strong a solution could be used without injury to the foliage. This, again, made it necessary to adopt some method of "standardizing" the spray. We finally adopted what may be termed the "stock solution" method of preparing the spray, and adopted as a standard for the work the "stock solution" having a specific gravity of 1.27. (For determining the strength of the solution in the field we have found the hydrometer to be a very convenient instrument. It is cheap, simple and efficient.)"

During the season of 1908 we found that growers had difficulty in obtaining specific gravity hydrometers from their local dealers, and have therefore adopted the Beaume scale hydrometer for heavy liquids or the Beaume acid scale hydrometer instead, and have taken as the standard stock solution one which tests 30 degrees by this scale. Such a stock solution as we have used the past two seasons may be:

Sulphur, best, finely ground 110 lbs.
Lime, best grade, unslacked...60 lbs.
Water, sufficient to make...60 gal.

Slake the lime, mix the sulphur into a thin paste with a little water, add enough water to make 60 gallons, bring to a boil and boil for one hour. The sediment is then allowed to settle, after which the clear, dark, amber-colored liquid is drawn off and may be stored in casks for future use.

It must be admitted that the stock solutions which are prepared as above described will, for various reasons, not be uniform in strength. They should not, however, fall below 26 degrees and may often reach 31 degrees or even 32 degrees. The strength of a "stock solu-



FIGURE 3. PROPERLY SPRAYED TREES AT SAME TIME
Photographs for Figures 2 and 3 were taken the same day

by the use of dilute lime-sulphur solutions. In that article mention was made of the fact that, owing to the "bordeaux injury" or "russetting" which frequently follows applications of bordeaux mixture, it seems to be desirable that some spray be discovered which may be used as a substitute; that I had been led to test dilute solutions of lime-sulphur in connection with bordeaux as a preventive of scab, and that it had not only given

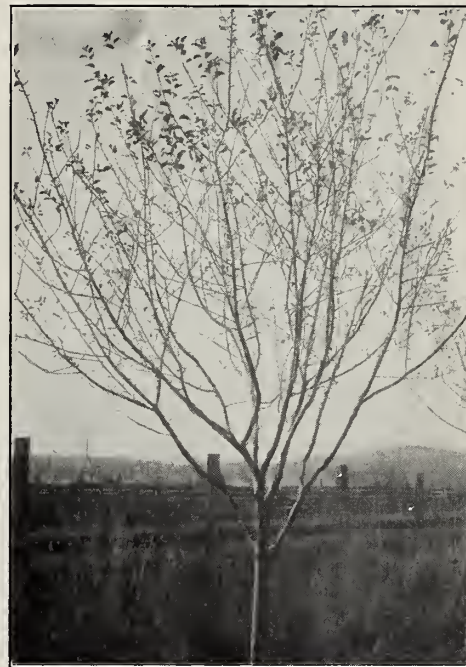


FIGURE 2. TREE NEARLY DEFOLIATED BY APPLE SCAB AND DROUTH

tion," however, is immaterial, except as a matter of convenience, provided it be known, since sprays of uniform strength may be prepared from stock solutions of different strengths by properly varying the amount of water to be used in diluting them. Most growers prefer to use



PROFESSOR A. B. CORDLEY
Entomologist State Experiment Station, Corvallis, Oregon, a recognized authority whose work on anthracnose alone has saved the state many thousands of dollars



FIGURE 1. APPLE BLOSSOMS AT THE RIGHT STAGE FOR THE FIRST APPLE SCAB SPRAY

the various commercial preparations, rather than to be to the trouble of preparing their own stock solutions. No doubt some of these may be safely used and will give as good results as can be obtained from home-made sprays, but I wish it distinctly understood that all of the work outlined in this article has been



FIGURE 4. SLIGHTLY SCABBY

done with a stock solution prepared as above described, and that we have not at any time tested any of the commercial lime-sulphur preparations for summer applications, and have never either recommended them or condemned them for this purpose. We have tested them as winter sprays and have found them efficient. We have reason to believe that most of them may be used for summer

work, but at present have no definite information upon the subject.

The chief fault to be found with these commercial preparations is that they cost too much. The retail price is \$7 to \$10 and \$12 per barrel of 50 gallons. The lime and sulphur necessary to prepare 50 gallons of stock solution which is equally efficient costs at present retail prices not to exceed \$3.

Strength of Spray Used

"During the season of 1907 these stock solutions of lime-sulphur were used variously diluted, upon the apple, pear, peach, plum, prune, quince, cherry, grape, potatoes and celery. The results obtained indicated that lime-sulphur sprays produced by diluting 1 gallon of stock solution (specific gravity, 1.27, Beaume 31 degrees) with 15 gallons of water, may be safely used upon all of the above plants, with the exception of the peach, unless it be used early in the spring, when very slight injury to the foliage was produced."

This strength of spray, therefore, was used throughout all of the apple-scab experiments of 1907 with no injury to fruit or foliage except the very slight injury mentioned above, and with most excellent results. However, in attempting to use the same strength of spray last spring immediately after the apple blossoms had fallen, considerable injury was done to foliage, and we were compelled to dilute 1 to 18 before all injurious effects could be eliminated.

In this respect it is of interest to note the variable results obtained by different growers. Some who diluted their stock solutions 1 to 15 reported excellent results and no injury; others have said some injury was done to the foliage; while still others, who claim to have diluted 1 to 20 and 1 to 25, have reported serious injury. A few growers have also reported that the spray caused considerable dropping of fruit, though no injury was done to the foliage.

This reported injury to the fruit is evidently based upon wrong inferences which were drawn from observed facts. An examination of the fallen fruit in several instances demonstrated that it had not been pollinated, and since poor pollination was common last spring and serious dropping occurred in orchards which were not sprayed, it is reasonable to assume that the reported injury to the fruit was due not to the spray but to the lack of pollination. More-

over, our own observations have repeatedly shown that no injury whatever is produced to the fruit by the lime-sulphur spray unless it be used so strong as to cause serious injury to the foliage.

Whether the variable amount of injury to foliage reported by growers was due



FIGURE 6. "BORDEAUX INJURY" ON YELLOW NEWTOWN

to the use of particular brands of commercial sprays, to poorly prepared sprays, to variable susceptibility of different varieties, to location, to carelessness, or to some other cause, has not been determined. Our own experience, however, showed conclusively that the same trees which in 1907 were sprayed 1 to 15 without injury, were seriously injured when sprayed with a spray of exactly the same strength in 1908. This apparent anomaly can, I believe, be accounted for by the different climatic conditions of the two seasons. From April 15 to May 17, during which period all of the spraying was done in 1907, but .73 inches of rain fell, and the minimum temperature fell as low as 32 degrees upon only one night. In 1908, during the same time, 4.1 inches fell. The minimum temperature reached 30 degrees upon one night, and upon two successive nights, May 8 and 9, touched 32 degrees. It seems apparent, therefore, that the abundant sunshine and milder temperature of 1907 produced a vigorous, hardy, spray-resisting growth of foliage, while the excessive rainfall, cloudy weather and low temperature of 1908 produced a growth which was less vigorous, less hardy, more edematous and more susceptible to



TWO-YEAR-OLD SPITZENBERG, CRESCENT FRUIT COMPANY'S ORCHARD, W. G. PARMELEE, HOOD RIVER, OREGON

Nine years Mr. Sears, early an orchardist of Hood River Valley, now deceased, urged one of his workmen to buy this forty acres at \$15 per acre. Today the owner values it at \$2,000 per acre, \$80,000.



FIGURE 5. SCABBY YELLOW NEWTOWN

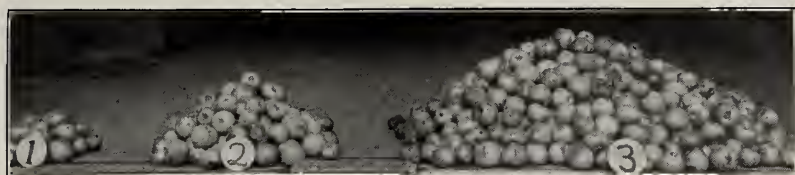


FIGURE 7. FRUIT FROM UNSPRAYED TREES. (1) FREE FROM SCAB. (2) SLIGHTLY SCABBY. (3) BADLY SCABBY

spray injury. However, since it is extremely improbable that the peculiar conditions which prevailed last season will be repeated, I am of the opinion that 30 degree stock solutions when diluted 1 to 18 can usually be used when spraying for scab with perfect safety.

When to Spray for Scab

During both seasons the same block of four hundred Yellow Newtown trees was used in the experiments, first, because this variety is exceedingly susceptible to scab; second, because this particular orchard had been badly neglected and was known to be thoroughly infested; third, because the trees were very uniform in size and vigor, and, fourth, because it was conveniently located. Each season the entire orchard was sprayed with lime-sulphur for San Jose scale.

In 1907, this application was made in February. The orchard was then divided into two plats, one of which was sprayed with bordeaux mixture, the other with lime sulphur solution. The applications were made as nearly as possible at the

badly scabbed and unmarketable; and 4, that showing spray injury:

1907.	1	2	3	4
Unsprayed	19.9	28.7	51.3	00.0
Sprayed three times with bordeaux	49.1	35.4	15.5	31.9
Sprayed three times with lime-sulphur	79.3	15.3	5.3	00.0

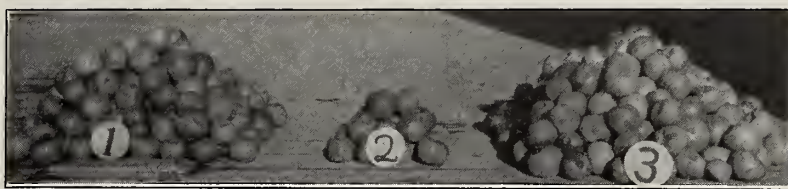


FIGURE 9. FRUIT FROM TREES SPRAYED TWICE WITH LIME-SULPHUR (1) FREE FROM SCAB. (2) SLIGHTLY SCABBY. (3) BADLY SCABBY

1908.	1	2	3	4
Unsprayed	15.1	17.1	67.1	00.0
Sprayed twice with self-boiled lime-sulphur	50.0	16.5	33.3	00.0
Sprayed twice with 3-3-50 bordeaux	55.9	8.0	35.9	52.1
Sprayed twice with lime-sulphur	69.6	18.8	11.3	00.0

in 1907. It is also to be observed, however, that during both seasons, when used side by side under conditions as nearly alike as it was possible to make them, the lime-sulphur solutions have given decidedly better results in controlling scab than did the bordeaux, and have in no instance caused any "spray injury" or "russetting" of the fruit.

Conclusions

1. Apple scab is the most difficult to control of all diseases of the apple, particularly in humid regions. It is, I am convinced, largely because of its ravages upon fruit and foliage that the idea has become current that some of the choicest but susceptible varieties of apples cannot be successfully grown in the Willamette Valley and other humid portions of our state. If this be true, the problem of the successful growth of such varieties

becomes largely a problem of scab control. I believe as a result of observations upon the orchard in which our experiments have been conducted that this is particularly true of the Yellow Newtown.

2. Apple scab can be controlled by proper spraying with either bordeaux mixture or lime-sulphur solutions. In humid regions probably at least three applications are necessary: The first just as the blossoms are beginning to show color; the second, just after the petals fall, at the time of the first codling moth spray; the third, some two to three weeks later.

3. We have found it perfectly practicable to combine any good brand of arsenate of lead with pure lime-sulphur solutions made as above directed.

4. The results of two seasons' work indicate that properly prepared lime-sulphur solutions may be advantageously substituted for bordeaux mixture when spraying for apple scab. It has produced each season a larger percentage of fruit free from scab and has not produced any "russetting" of the fruit.

5. Further experimental work is necessary to determine the proper strength of spray to use, but a 30 degree stock solution diluted 1 to 18 may safely be used upon the apple.



FIGURE 8. FRUIT FROM TREE SPRAYED TWICE WITH BORDEAUX MIXTURE (1) FREE FROM SCAB. (2) SLIGHTLY SCABBY. (3) BADLY SCABBY

same time and all the conditions surrounding the experiment were made as exactly alike as possible for the two plats except the kind of spray used. The first spraying was given April 20, just as the blossoms were beginning to show color; the second application was made May 8, just after the petals had fallen; and the third was made May 18.

In 1908 the orchard was again sprayed for San Jose scale in February. For the purpose of testing the value, if any, of late winter applications for scab, the orchard was again sprayed April 4, just before the buds started, and no more applications were made until after the blossoms fell, May 9 to 23, and the last one was made June 6 to 8.

Results Obtained

A summary of the results is given in the following tables, in which 1 shows per cent of fruit free from scab; 2, that having only small scab specks; 3, that

It will be observed by reference to the tables that somewhat poorer results were obtained in 1908 than in 1907. This is no doubt due not only to the elimination of the application just as the blossoms are opening, but also to the climatic conditions, which were much more favorable for the development of scab in 1908 than



MAGNIFICENT EXHIBIT OF WILLAMETTE VALLEY CANNED FRUITS AT OREGON STATE FAIR

SOME NOTIONS ABOUT THE SPRAYING OF TREES

BY A. L. MELANDER, PULLMAN, WASHINGTON

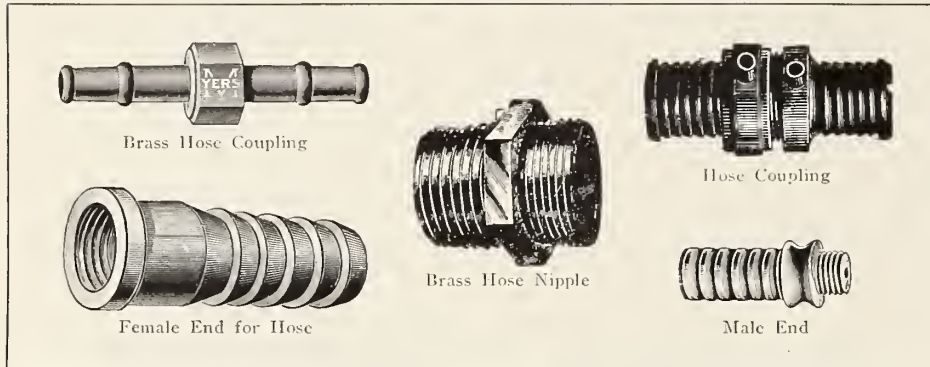
SPRAYING is a necessary item in the cost of producing fruit. That does not mean, however, that it must be an expensive item, for the fruit grower can so plan his spraying as to reduce its cost to a minimum. The com-

tain 200 pounds pressure, for there has been a public demand for high pressure pumps and the manufacturers have come to making high pressure, high efficiency outfits to satisfy this demand. But spray pump catalogues are only too often silent

per minute and maintain 200 pounds pressure.

The nozzle has much to do with quickness and efficiency. Practically, there are two kinds of nozzles in use, the mist-spray vermored and the fan-spray bordeaux. The former throws a small quantity of liquid, finely broken up as a fog-like mist, and applies an excellent superficial film of spray. The bordeaux nozzle throws a coarse, penetrating spray and throws out about four times as much liquid as the small vermored. Nozzle for nozzle, it takes one-fourth as long to spray when using the bordeaux as when using vermoreds. The small opening of the mist nozzle makes it clog often, and that wastes time. The hollow cone of mist that it throws out makes it miss what it is aimed at, and that is wasteful of material. And as it has no penetration it gives poor protection against the majority of orchard pests. From every viewpoint, the vermored nozzle is an expensive nozzle to use, and it has been discarded by most of the growers in the Northwest.

The penetrating, sweeping spray of the bordeaux nozzle thoroughly drenches whatever is sprayed. It is driven beneath winter buds, it forces leaves and fruit aside, and it reaches the innermost



mercial grower sees that whatever he can save on his spraying bill is so much profit, and he is in the business for the profit, not for the expense.

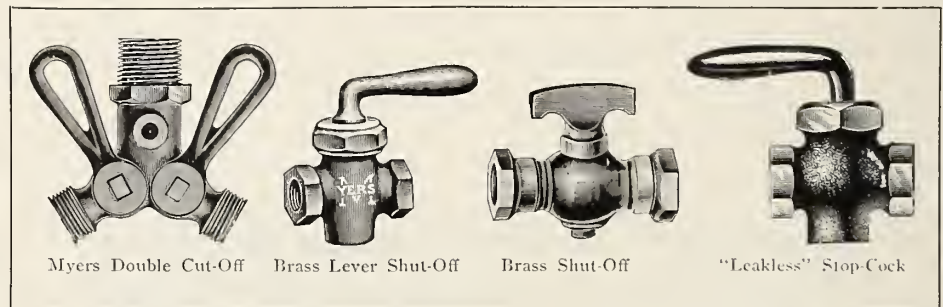
Economical spraying must have two things in view, cheapness of application and results. Spraying can be done most cheaply by using the weakest effective spray solutions and by doing the work as quickly as possible. Quick work, however, does not mean slurring, for then the second measure of economical spraying, good results, could not be had.

The following method of quick spraying is worthy of the attention of every fruit grower, for more than any other method it is conducive to 100 per cent returns. The first axiom in spraying is that doubling the pressure cuts in two the time it takes to spray. Spraying at 50 pounds takes twice as long as spraying at 100 pounds, or four times as long as if the work was done at 200 pounds. In other words, it costs twice as much for labor to spray at 100 pounds as it does to spray at 200 pounds. In codling moth spraying, where the work must be finished before the closing of the calyx, the time element is a most important consideration. Many a grower could get his spraying accomplished on time if he but increased the pressure.

There is a vast difference in pumps. Many power sprayers today can main-

tain 200 pounds pressure, for there has been a public demand for high pressure pumps and the manufacturers have come to making high pressure, high efficiency outfits to satisfy this demand. But spray pump catalogues are only too often silent

as to the number of gallons per minute their pumps can furnish. High pressure has been attained in our modern pumps, but often at the expense of capacity. Some power sprayers at 200 pounds can furnish ten gallons per minute, others but five. The first does the same work that two of the latter are

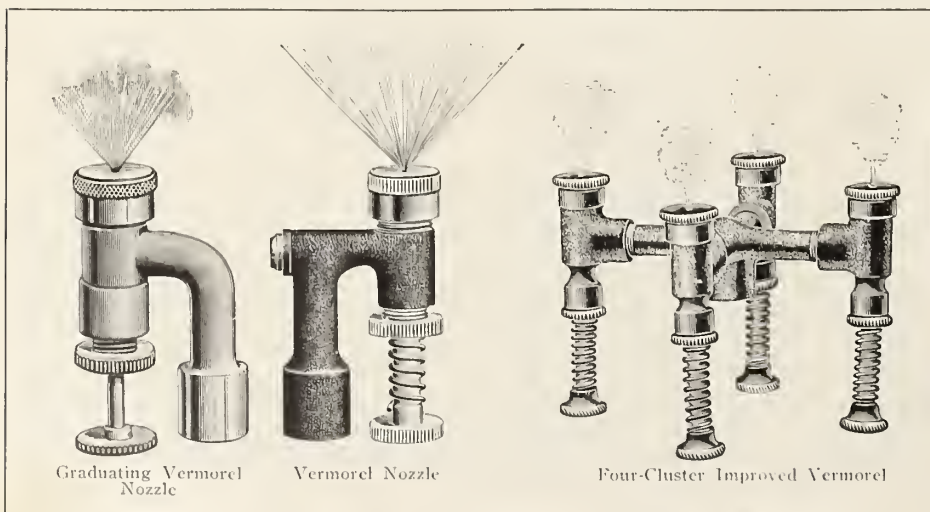


required for, but it takes the same men and horses to operate either spray pump. The labor cost per day is constant, regardless of the capacity of the machine. The coming demand is that our power sprayers increase their capacity, maintaining still their high pressure. As a standard for best practical work I should say that a pump should be able to deliver at least ten gallons

per minute and maintain 200 pounds pressure. It is therefore efficient. At 200 pounds pressure it throws two and a half gallons per minute. It is therefore rapid. As it reaches the pests, placing the liquid where it is needed, it cannot be considered a wasteful nozzle. The bordeaux nozzle is certainly the best type of nozzle we have today, and commercial fruit men have adopted it for practically all their spraying.

One point that many fruit men fail to appreciate is that the capacity of a pump is limited. A hand pump with a capacity of two and one-half gallons per minute is often equipped with two leads of hose. It would be better to throw out the two and one-half gallons through one bordeaux nozzle at 200 pounds pressure, or thereabouts, than to distribute it through two leads of hose at 100 pounds each, or, as is sometimes done, through four nozzles at 50 pounds each. The same amount of liquid is used in either case, but the single nozzle at high pressure can accomplish results because of its penetration that would otherwise not be obtained. Instead of two leads of hose to a hand pump, use but one, and then if you must work your third man have him help pump.

In this Western country, where labor is especially expensive, we are anxious to get through our work as rapidly as possible. Nobody cares to spray with lime-



sulphur for two weeks if he could do the work better in a few days' time. As a result, the West has adopted the power sprayer to a greater extent than elsewhere. Some Wenatchee growers with ten acres or less own power sprayers for their own use, for they appreciate the advantage of a high efficiency pump. The Colorado standard is twenty acres to a power sprayer. With the best type of power outfit more than twenty acres can be allowed. To show the difference in expense in operating power and hand pumps, let us consider a twenty-acre orchard, 100 trees to the acre, and for codling moth spraying six gallons per tree. With the hand pump of two and one-half gallons capacity, consider either two leads of hose and one man pumping, or two men pumping and one lead of hose.

Hand Pump, Per Day

One horse	\$1.50
Three men at \$2.00	6.00
Total labor cost	\$7.50
Gallons thrown600

Power Pump, Per Day

Team	\$3.00
Three men at \$2.00	6.00
Gasoline50

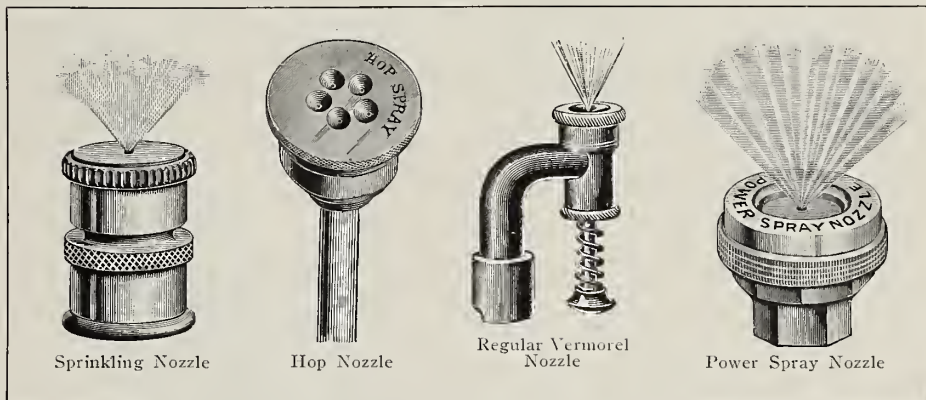
Total labor cost	\$9.50
Gallons thrown	2.400

The hand pump would therefore do an acre a day. For the twenty acres two outfits would be necessary to finish work

nately, for most of our pests at least, the high pressure, downward directed, coarse spraying which is the most economical of time is also the most efficient. It is the method that yields 100 per cent results. We want a method that wets through the wool of the woolly aphis, that reaches the aphis eggs behind the swelling buds, that thoroughly coats the

How do we spray downward? By spraying from an elevated platform, maybe three feet high, maybe ten, according to the height of the trees. The end of the spray rod must be fitted with an elbow joint to throw the spray at an angle of 45 degrees. Then add thoroughness.

Results count. That is what the prac-



San Jose and oyster shell scales, that drenches the cocoons of the bud moth, and that will penetrate beneath the fleshy stamens of the apple blossom. We want a method that assures thor-

tical grower looks for. The efficiency of any method of spraying is measured by the results attainable. With the high efficiency spraying, that is, the pressure driven, coarse, penetrating spray, mostly directed downward and abundantly and carefully applied, the results are nearest perfect, and the method has the additional advantage of economy. The high efficiency method is logical.

◆ ◆ ◆

Underwood, Wash., Feb. 25, 1909.

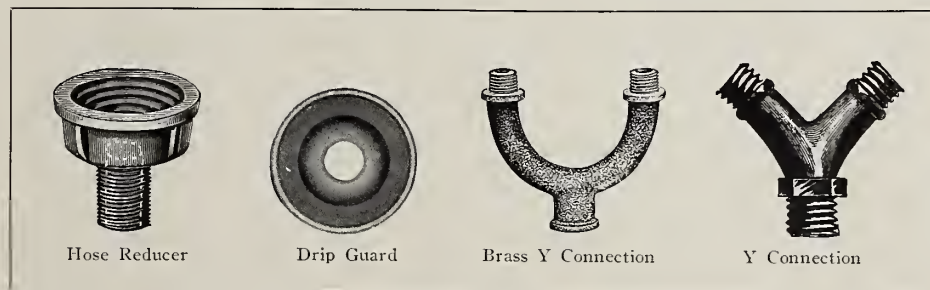
E. H. Shepard, Hood River, Oregon:

Friend Shepard—We won "Best Commercial Pack," second on "Ten-box Newtowns," and "Best Four-tier Newtowns." This should all be credited to Hood River system.

Underwood is coming on with a rush. People have just discovered it through ads. in "Better Fruit," and it keeps us busy finding room for them all.

We have organized under the name of the Apple Growers' Union of the White Salmon Valley. Headquarters at Underwood, and are preparing to build a warehouse 100x100 this spring, in time to handle the berry crop.

Yours very truly, W. F. Cash.



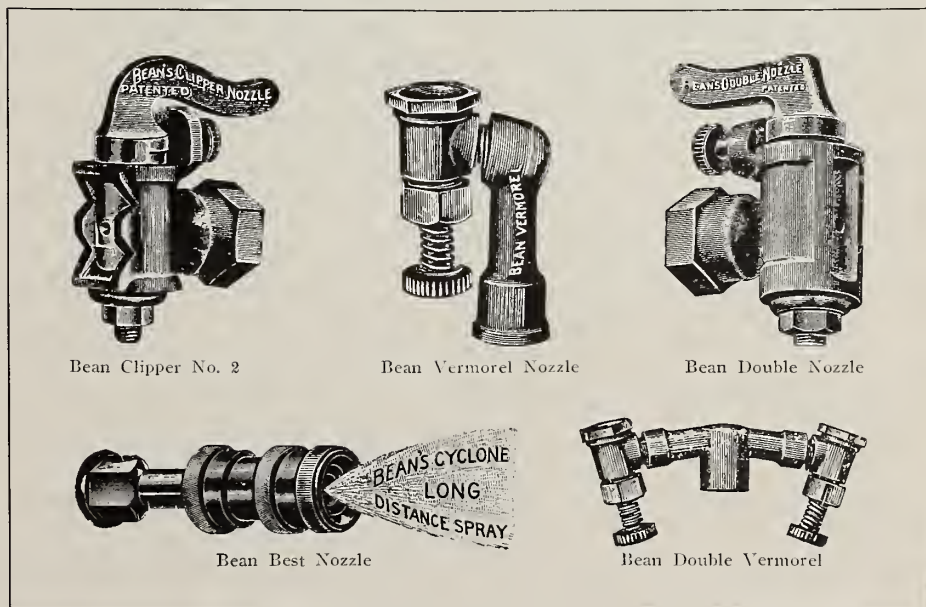
in the ten days' time before the calices close. The labor cost for the twenty acres would be \$150.

The power pump would do four acres a day, or the twenty acres for \$47.50. Even allowing for the difference of interest on the \$400 power outfit and the two \$50 hand pumps, amounting to \$40 and \$10 respectively, it can clearly be seen that the hand pump is too expensive for the progressive fruit grower.

Many fruit growers use sprays unnecessarily strong. We are recommending after repeated tests the use of one pound of arsenate of lead to fifty gallons of water as the best practical strength for codling moth. The future will probably show that this can be much reduced, but even so, it is about one-third the strength usually employed. Similarly, we advise sulphur-lime containing one pound of sulphur, one-half pound of lime to every five gallons of water. When the usual factory-made sulphur-lime is diluted one to fourteen it corresponds to this strength. Although the saving in salt, lime and sulphur may not amount to much for each orchardist, the aggregate saving for the community reaches a surprisingly large sum. When solutions as weak as these do as effective work as those doubly or trebly strong they are the ones for the grower to use.

It is not so much a correct formula that is necessary as a correct method of application. It is the method that is largely responsible for results. Fortu-

oughness with a single application. Only the downward directed, coarse, high pressure spray can do all this. Obviously all spraying must not be rained straight down. Many red spiders and scales would be missed if it were; but this method accomplishes vastly more good than if all the spraying were directed straight up from the ground.



BILL PROPOSED AS SUBSTITUTE FOR PORTER BILL

To provide for standard packages, grades, and marks for apples in closed packages entering into interstate and foreign commerce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of this Act the expression "interstate, territorial, or foreign shipment" shall mean and include any and all apples in closed packages that are being transported, or have been transported, or are intended for transportation, from any state or territory or the District of Columbia or any foreign country into any state or territory or the District of Columbia or to any foreign country or from any point in any territory or the District of Columbia to any other point in the same territory or the District of Columbia.

Section 2. That for the purpose of this Act the expression "closed package" shall apply to any barrel, box, basket, or other package the contents of which can not be readily seen or inspected when such package is prepared for shipment.

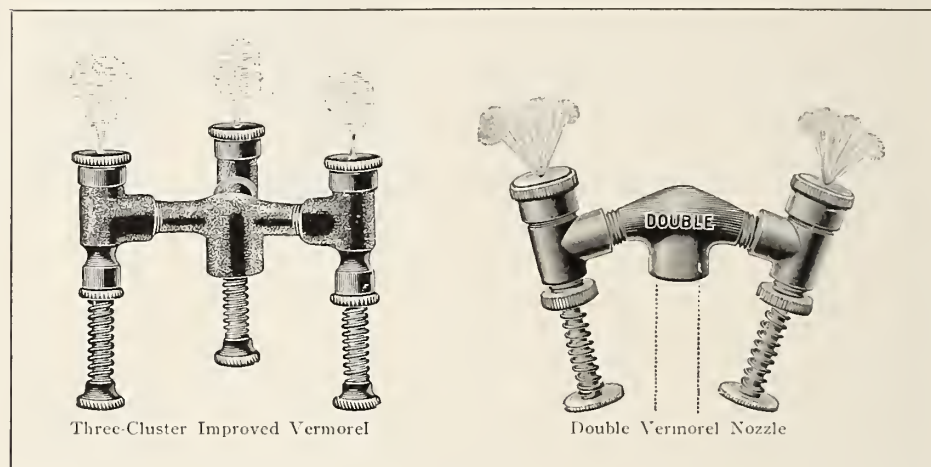
Section 3. It shall be unlawful for any person to make or receive an "interstate, territorial, or foreign" shipment of apples in closed packages or to have in his possession for sale in original or unbroken packages such closed packages of apples intended for, or which have undergone, such shipment, unless each and every package thereof conforms to the following specifications:

First—The standard package for apples packed in boxes shall be a box having a capacity of not less than two thousand three hundred and forty-two cubic inches, when measured without distension of its parts. Any box of less capacity when

used for apples shall be marked on both end and side, in a plain and legible manner with black letters of size not less than seventy-two point gothic, with the words "short box," or with the number of cubic inches it actually contains.

Second—The standard package for apples packed in baskets shall be a basket containing not less than two thousand three hundred and forty-two

ing, when seasoned and dry, a capacity not less than that of a barrel of the following dimensions when measured without distension of its parts: Length of stave, twenty-eight and one-half inches; diameter of heading, seventeen and one-eighth inches; distance between heads, twenty-six inches; circumference of bulge, sixty-four inches, outside measurement. Any barrel of less dimensions



cubic inches when measured level full without distension of its parts. Any basket of less capacity used for apples shall be marked on both top and side, in a plain and legible manner with black letters of size not less than seventy-two point gothic, with the words "short basket," or with the fractional part of a standard basket which it contains.

Third—The standard package for apples packed in barrels shall be a barrel hav-

ing, when seasoned and dry, a capacity not less than that of a barrel of the following dimensions when measured without distension of its parts: Length of stave, twenty-eight and one-half inches; diameter of heading, seventeen and one-eighth inches; distance between heads, twenty-six inches; circumference of bulge, sixty-four inches, outside measurement. Any barrel of less dimensions

Section 4. That any person who uses closed packages for apples intended for "interstate, territorial, or foreign" shipment that are not of "standard" size or capacity and who neglects to mark them as designated in this Act shall be subject to a penalty of not less than twenty-five cents nor more than one dollar for each package so used.

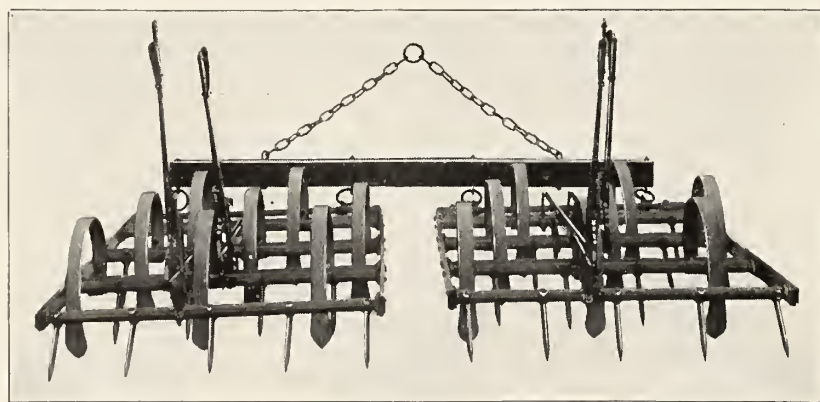
Section 5. That this Act establishes a standard grade for apples in closed packages intended for "interstate, territorial, or foreign" shipment, which grade shall be known as "U. S. Standard."

Section 6. That it shall be unlawful for any person to mark, or cause others to mark, closed packages of apples intended for "interstate, territorial, or foreign" shipment with the words "U. S. Standard" unless the fruit contained therein consists of well-grown apples of one variety, carefully hand picked, of good color for the variety, of normal shape, practically free from insect and fungus injury, bruises, and other defects, except such as are necessarily caused in the operation of packing, well packed and with not more than ten per centum below the above specifications, and unless said "U. S. Standard" be followed by one of the following marks designating the size of the fruit, namely:

(a) "Size A," which may be used to mark any "U. S. Standard" fruit running two and a half inches and over in transverse diameter, or

(b) "Size B," which may be used to mark any "U. S. Standard" fruit running two and a fourth inches and over in transverse diameter, or

(c) "Size C," which may be used to mark any "U. S. Standard" fruit running two and an eighth inches and over in transverse diameter; and unless—



THE NAYLOR 2-IN-1 IS A LIGHT DRAFT HARROW

We are often asked if the Combination Spring and Spike Tooth Harrow is a hard puller. It does not pull any harder than a spring tooth harrow cutting the same width. Why? A spike tooth drag when used alone must be weighted down to keep it from jumping and skipping the clods it ought to break up. This extra weight is extra work for the team. A spring tooth harrow will bury itself unless held up by runners or wheels. These runners are an extra drag on the team, but they do not cultivate the soil. The Naylor Harrow combines the working parts of both harrows and cuts out the useless weight and runners. Result: A harrow that rides through the field perfectly steady—no jumping around—and easy on the horses, because the hold of the spring teeth in the ground keeps the spikes from skipping, and the lift of the spikes keeps the springs from burying.

Fallon, Nevada.—Naylor Manufacturing Company—Gentlemen: I have used your harrow in sand and clay and find it is a very useful tool. Believe it saves one-half the time it would take to do as good work with any other harrow, as your harrow leaves the ground in better shape after going over it once than any other harrow would with covering the same ground twice.—Henry Geo. Ruchty.

De Pauw, Indiana. Naylor Manufacturing Company—My Dear Sirs: I thought I would write you to let you know what I think of your harrow. I think it is the best harrow of the kind I have ever seen, and if I could not get another I would not take \$50 for it. Yours truly, J. H. Price.

Sold by J. A. Freeman & Son, Portland, Oregon, General Agents for Oregon and Washington.

Second—Each and every package be marked in a plain legible manner before leaving the premises where packed with—

(a) The name and address of the packer or the person by whose authority the packing is done, and with

(b) The name and place where grown, and with

(c) The name of the variety contained in the package.

Section 7. That any person who shall sell, or offer, expose, or have in his possession for sale, any apples packed in closed packages intended for or which have undergone "interstate, territorial, or

ciation, within the scope of his employment or office, shall in every case be also deemed to be the act, omission, or failure of such corporation, company, society, or association as well as that of the person.

Section 12. That the Secretary of

J. L. DUMAS, PRESIDENT OF THE WASHINGTON STATE HORTICULTURAL SOCIETY FOR YEAR 1909

MR. J. L. DUMAS, of Dayton, who was elected to the presidency of the Washington State Horticultural Association at the annual meeting in Spokane, is a practical horticulturist and

Agriculture shall make rules and regulations for carrying out the provisions of this Act.

Section 13. That this Act shall be in force and effect from and after the first day of July, nineteen hundred and ten.

school, graduating in 1890. He then went to Hawaii as principal of the Honolulu normal and training school, and while there he served as lieutenant in the Citizens' Guard during the reconstruction period and was made a citizen under the government without fore-swearing his allegiance to the United States. He returned to Washington in 1897 and bought 140 acres of land in the Touchet Valley. Since then he has served as superintendent of the public schools at Pullman. He was president of the Washington State Educational Association in 1903-4 and was a member of the State Board of Education from 1900 to 1902. His wife was formerly Miss Fannie J. Storie of Lawrence County, New York, whom he met at Waitsburg, Washington.

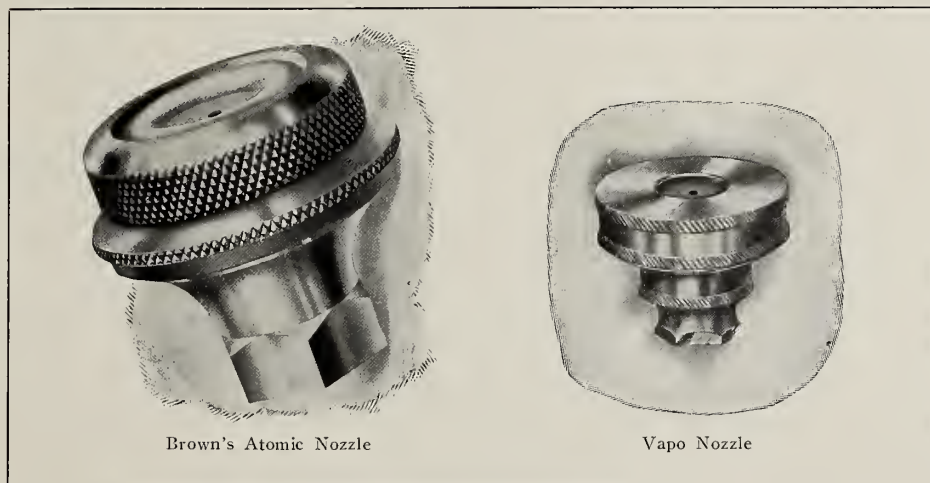
Almost the whole world knows of Hood River as a place that produces the best fruits, and all of Hood River Valley should know, and could know, that there is one place in Hood River, under the firm name of R. B. Bragg & Co., that the people can depend on getting the most reliable dry goods, clothing, shoes and groceries at the most reasonable prices that are possible; try it.

Many a fruit grower has had his profits increased four and five-fold by spraying, but there are still a large number who do not seem to realize its value.

Systematic spraying is the only way to get sure results in fruit growing. A good pump and practical preparations are a necessity to successful work.

The Deming Company, of Salem, Ohio, manufacture twenty-four styles of spray pumps, and issue a book on "Spraying for Profit" which they will send anywhere for 4 cents in postage stamps. This book gives practical instructions and was written by a prominent entomologist.

The Deming Company will be glad to send their catalogue, which contains a twelve-page spraying chart, free of charge, if desired.



Brown's Atomic Nozzle

Vapo Nozzle

foreign" shipment shall be subject to the penalties specified in this Act.

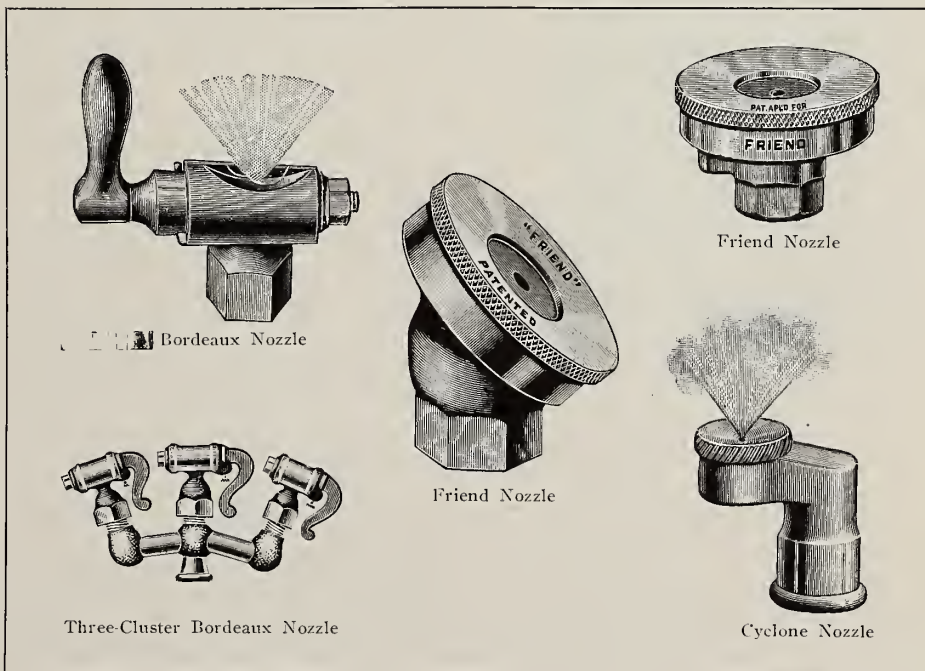
Section 8. That any person who uses the marks designated in this Act upon any closed package of apples that is intended for or has undergone "interstate, territorial, or foreign" shipment, the contents of which are not graded as specified in this Act for such grade, shall be subject to a penalty of not less than twenty-five cents nor more than one dollar for each package so falsely marked.

Section 9. That any person other than the original packer who repacks fruit marked under the provisions of this Act shall erase the name of the original packer from said package and substitute his own therefor, and any person who willfully neglects to make such substitution shall be subject to a penalty of not less than twenty-five cents nor more than one dollar for each package so repacked upon which substitution is not made.

Section 10. That any person who willfully imitates, alters, or effaces, or obliterates, wholly or partially, any of the marks prescribed in this Act with intent to deceive shall be liable to a fine of not less than twenty-five cents and not more than one dollar for each package upon which the marks have been altered, effaced, or obliterated.

Section 11. That the term "Territory" as used in this Act shall include the insular possessions of the United States. The word "person" as used in this Act shall be construed to import both the plural and the singular, as the case demands, and shall include corporations, companies, societies, and associations. When construing and enforcing the provisions of this Act, the act, omission, or failure of any officer, agent, or other person acting for or employed by any corporation, company, society, or asso-

has made a success of apple growing. His 100-acre orchard in the Touchet Valley, Central Washington, known as Pomona Ranch, is one of the best in the state. The trees are from nine to twelve years old, the crop of 1908 bringing more than \$65,000. Mr. Dumas is a native of Missouri, born in Clark County in 1862. He left the old homestead to become a teacher, coming to Washington in 1882, when he entered Whitman College at Walla Walla. After working his way through college he went to Oswego, New York, where he attended the normal and training



Bordeaux Nozzle

Friend Nozzle

Friend Nozzle

Three-Cluster Bordeaux Nozzle

Cyclone Nozzle

EXPENSE vs. INVESTMENT IN FRUIT GROWING

EXPENSE is a necessary evil; it is the cost of doing business; while investment is an expenditure out of which returns are expected. How many fruit growers recognize the difference? To some it seems that the purchase price of their land only is an investment, while the necessary buildings, implements, labor, sprays, etc., are all lumped up as expense.

Why, for instance, will a right-minded man resist the fruit inspector who asks him to spray his orchard? Simply because he regards the spraying as an expense which, if avoided, would figure as a gain. Sprays rightly purchased and properly applied are not expense but investment. There is perhaps, no feature of orchard work where the returns are so great as those growing out of proper spraying. One instance coming to writer's notice is to the point: A twenty-acre place neglected brought \$20.00 for entire crop of apples and pears. The same place, after a couple seasons' care and heroic spraying, produced \$500.00 per acre. The care and spraying of that place was investment out of which a handsome profit was made.

Why should an intelligent orchardist quibble over the cost of a few barrels of well known reliable spray as against the possibility of saving a few dollars in the chance that he might make his own spray good enough to pass? It is because he fails to keep his books right. He is charging to expense what

should be placed to investment account. He fails to figure right, as do also some of our college friends who are wont to advise the use of home-made lime-sulphur spray. For instance, one fifty-gallon barrel of high-grade commercial lime-sulphur will make six hundred gallons spray, winter strength. The Oregon formula for home-made is fifty pounds sulphur, fifty pounds lime and one hundred and fifty gallons of water. To make six hundred gallons spray would require four times this quantity, which would figure out something like this:

200 pounds sulphur, lowest price 2c.....	\$4.00
200 pounds lime, about 1c.....	2.00
Fuel, say 1/4 cord at \$4.00.....	.50
Labor (some men do not think labor costs anything)	2.00

Total minimum cost.....\$8.50

This is the cost on the theory that the farmer can get into solution and make available a large portion of his materials. Does he? The Piper or Washington formula 1-1-4, is only different in degree. It is claimed that theoretically the Piper formula equals in strength the commercial sprays, Niagara and Rex, when they are diluted one to eleven. Theory and practice sometimes differ. Can the farmer get results in practice equal to theory?

BRILLIANT FUTURE OF THE STATE OF IDAHO

BY S. H. BOLTON, TWIN FALLS, IDAHO

IDAHO, the gem state, will in the near future be the wealthiest in the United States, with the largest area of irrigable land, not only in this country, but of any tract in the world, not excepting the mighty Nile Valley in Egypt.

No state in the Union has the abundant water supply as the Twin Falls district of Southern Idaho. The great Snake River, with its head away up in the Teton Mountains in the Yellowstone National Park, with its reservoirs in the great Jackson Lake. There is now segregated and under water (the South Side Land and Water Company) 280,000 acres. The North Side Land and Water Company, 180,000 acres; Minidoka Government project, 170,000 acres. All the above has water upon it, or will have by April 1. There is segregated, and they are working on the Salmon River Land and Water Company 80,000 acres. The West End Land and Water Company, 50,000 acres; Clover Creek project, 45,000 acres; King Hill, 15,000 acres; Idaho irrigated tract, 150,000 acres; Goose Creek tract, 52,000 acres; Bruneau Extension tract, 600,000 acres; Bruneau tract, 150,000 acres. Making a total of 1,562,000 acres.

The development made thus far is astonishing. On the Twin Falls South Side a number of towns have sprung up, principally Twin Falls, with a population now of over 5,000. Two school buildings have been erected in Twin Falls, one costing \$40,000, including building and furnishings, and the new Lincoln just finished, the best school building in the state, costing \$65,000 to build. New courthouse Twin Falls County, \$150,000, work to begin March 1, 1909.

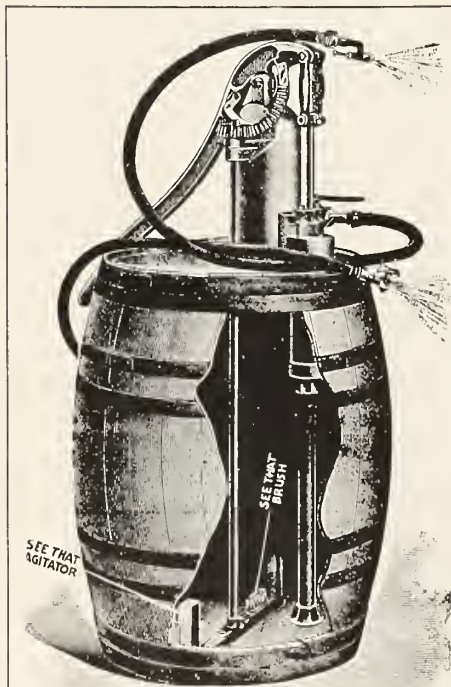
Thousands of acres of fruit trees have been set, mostly winter apples. These show a fine growth and three-year-old trees had quite a sprinkling of fruit last year, also peaches of fine sizes and

Against the above cost of home-made, figured upon most favorable terms, a certain and reliable commercial spray can be bought for \$9.00 per barrel, equaling 600 gallons of spray. When the freight compels a higher price for the commercial spray the cost of home-made also goes up, yet most every fruit publication one picks up contains—and possibly this issue of our esteemed "Better Fruit" will also contain—serious and elaborate directions for making lime-sulphur spray, and this notwithstanding that most all the leading orchardists are and have long been using the well-known ready-made lime-sulphur sprays found on the market.

Let every man work at the trade or business he best understands. The man who knows how to grow prize apples should continue to let the man who knows how to make spray do so.



BORDEAUX BUCKET PUMP
Portland Seed Company, Agents, Portland, Oregon



EMPIRE KING SPRAY PUMP

Of the many styles of pumps we have handled, we certainly never have found a more satisfactory outfit than the "Empire King," shown in the accompanying cut. It is all of metal, the plunger, cylinder, valves and valve seats being of heavy turned brass. Extremely simple in construction, all parts easy to get at from above, with nothing to wear out, it is the ideal pump for the farmer who knows little or nothing of engines and machinery. Easily fills two leads of hose, giving sufficient pressure to make the work effective. Sold by Pacific Seed Company, Portland

flavor. Small fruit shows to perfection. This year many orchards will be four years old, and there will no doubt be a grand showing of fruit. Thousands of acres will be set this spring, and our nurseries are oversold. Along the Snake River and foothills there are many old orchards at much higher altitude that are in full bearing and have given large crops for years. The Perrine orchard netted I. B. Perrine \$17,500 last year, and this year's crops and returns were in excess of last year. The cut of the bird's eye view of this location, and our prediction is that this will prove one of the largest apple growing districts in the United States.

HENS THAT LAY IN WINTER AS WELL AS SUMMER IS WHAT YOU WANT

I am selling a limited number of settings from my Special Pen of SINGLE COMB RHODE ISLAND REDS. These birds have been prolific layers through December, January, and February.

\$2.50 for FIFTEEN EGGS

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Salem Tile Factory



GOLD MEDAL

Highest award on Tile at Lewis and Clark Fair

Tile From 3 to 12 Inch

Order carload lots or for further particulars write for booklet or call on or address

J. E. MURPHY

Fairgrounds Post Office, Oregon

WASHINGTON STATE COLLEGE SPRAY CALENDAR

JANUARY, 1909

WRITE FOR INFORMATION TO THE WASHINGTON AGRICULTURAL EXPERIMENT STATION, PULLMAN, WASHINGTON

Pest	Plant Attacked	What to Use	When to Use	Notes
1 Oyster Shell Bark Louse	Apple, mainly.....	Sulphur-lime	When leaves are off the trees	If this spraying is ineffectively done, apply kerosene emulsion or whale-oil soap when eggs hatch
2 San Jose Scale...	Nearly all deciduous trees	Sulphur-lime	In spring before buds burst.	
3 Red Spider.....	Fruit trees and bushes...	Sulphur-lime	In spring before buds burst.	This will kill the winter eggs. If the mite appears in summer, use kerosene emulsion, best adding 1 ounce of sulphur to the kerosene for each gallon of spray, or use sulphur-lime half strength
4 Blister Mite.....	Pear leaf.....	Sulphur-lime	In spring before buds burst.	
5 Green Aphis.....	Apple, pear, peach, plum, prune, etc.	Sulphur-lime	In spring before buds burst.	If the insects appear, spray with tobacco into the curling leaves
6 Bud Moth, Peach Worm or Twig Borer	All orchard trees.....	Sulphur-lime	As the buds are swelling....	Supplement with arsenate of lead when the buds open. Repeat in one week if necessary
7 Woolly Aphis.....	Apple	Sulphur-lime, kerosene emulsion or tobacco	Just before buds burst.....	Spray with force. Summer treatment, kerosene emulsion or tobacco
8 Black Aphis.....	Cherry	Tobacco	When insects appear.....	
9 Leaf Hopper.....	Apple	Tobacco	When insects appear.....	
10 Codling Moth.....	Apple, pear.....	Arsenate of lead.....	While the last blossoms are falling	Use a bordeaux nozzle with a crook and spray with force from a raised platform directly into every flower. If so applied, one spraying is sufficient
11 Slug	Pear, cherry.....	Arsenate of lead.....	When insects appear.....	Or dust with lime, road dust or ashes
12 Tent Caterpillar...	All orchard trees.....	Arsenate of lead.....	When insects appear.....	Burn the tents
13 Climbing Cutworm	Orchard trees.....	Poison bait.....	Scatter when insects appear.	
14 Trunk Borer.....	Orchard and other trees.	Bordeaux		Dig out the worms with a knife. During the growing season whitewash trunk with sulphur-lime containing extra lime
15 Grasshopper	Garden and orchard plants	Bordeaux	When insects appear.....	This is a repellent
16 Flea Beetle.....	Garden plants.....	Bordeaux	When insects appear.....	
17 Cutworm	Garden plants.....	Bordeaux	When insects appear.....	Scatter poison bait before planting
18 Root Maggot.....	Root crops.....	Sulphur-lime or kerosene emulsion	Apply to soil before maggots appear	Start plants under muslin
19 Cabbage Worm...	Cabbage, cauliflower....	Poison bait.....	Dust the plants before the worms eat in	
20 Aphis	Garden and ornamental plants	Tobacco or kerosene emulsion	Just as soon as insects appear	Repeat if necessary
21 Hop Aphis.....	Hop	Whale oil and quassia...	When insects appear.....	Repeat if necessary
22 Moss and Lichens.	Fruit trees.....	Sulphur-lime	When leaves are off the trees	
23 Leaf Curl.....	Peach	Sulphur-lime	Just before the buds open...	
24 Mildew	Peach, apple, grape, rose, etc.	Sulphur-lime	Just before the buds open...	
25 Brown Rot or Fruit Mold	Plum, cherry, peach....	Bordeaux	Just before blossoms open...	
26 Scab	Apple, pear	Sulphur-lime	Just before blossoms open...	Again while the last blossoms are falling
27 Fire Blight.....	Pear and apple.....			Prune out every sign of blight, cutting well below the disease. Dip the knife frequently in carbolic acid, or corrosive sublimate (1-1000)
28 Blackspot Canker.	Apple	Bordeaux, double strength	Immediately after leaves fall	Again three weeks later
29 Scab	Potato	Formalin, 1 pound to 30 gallons water		Soak seed for two hours, then cut and plant. Do not plant in soil where scabby potatoes were grown
30 Potato Blight....	Potato	Bordeaux	July 1 to 15.....	Again two weeks later. If blight is bad on unsprayed potatoes near by, follow with a third application two or three weeks later
31 Western Tomato Blight	Tomato			Spraying will do no good. Set out strong plants, close together, or plant the seed thick in the rows. Give the best of care, shade, and give plenty of water. You will probably lessen the blight
32 Anthracnose	Bean	Bordeaux	When plants are all started.	Again three weeks later. Follow with a third spraying three weeks later. Reject all diseased seed.
33 Smut	Wheat and oats.....	Formalin, 1 pound to 45 gallons water		Spray the seed thoroughly; let it lie in a pile two hours; dry, and plant with a clean seeder.

Poison Bait

Paris green 1 part
 Bran 40 parts
 Mix well. For cutworms make a mash by adding water. Season with a little salt.

Tobacco

Tobacco leaves..... 1 pound
 Water 4 gallons
 Simmer for one hour and strain. Two pounds of tobacco dust or ground tobacco may be substituted for the leaves. Black Leaf extract may be used 1 part to 65 of water.

Whale Oil and Quassia

Quassia chips 8 pounds
 Whale oil soap..... 7 pounds
 Soak the chips twelve hours in eight gallons of water. Dissolve the soap in boiling water. Strain the quassia extract to remove the chips, and add the soap solution. Stir thoroughly and dilute to make 100 gallons. This solution is used almost exclusively for the hop aphid. It is almost as effective without the quassia against other species of aphid. Soap powder or laundry soap may be used in the same proportion without the quassia for most aphids.

Kerosene Emulsion

Kerosene 2 gallons
 Whale oil soap..... ½ pound
 Water 1 gallon

Dissolve the soap in the water by boiling, and add the kerosene, away from the fire. The mixture is then to be agitated violently, preferably by pumping it back on itself with a force pump. After four or five minutes the mixture suddenly becomes creamy in consistence. If well made, the cream will stand for a long time without free oil rising to the surface. Unless otherwise stated, use 1 gallon of the emulsion to 12 gallons of water in spraying. One quart soft soap or 1 pound laundry soap may be used instead of the whale oil soap.

Bordeaux

Bluestone 6 pounds
 Good lime..... 4 pounds
 Water 50 gallons

Dissolve the bluestone by suspending it in a sack in 25 gallons of water in a barrel. Slake the lime in another vessel, adding a little water slowly, and dilute to 25 gallons. Mix the two thoroughly. Even the best bordeaux may scorch in rainy weather. For double strength bordeaux use twice as much bluestone and lime.

Sulphur-Lime

Sulphur 1 pound
 Good lime ½ to 1 pound
 Water 5 gallons

First slake the lime in the cooking vat. When slaked add the sulphur and about one-fifth of the water, so that the mixture will boil easily. Keep it well stirred. Boil until the sulphur is completely dissolved, which should take less than an hour. Then add the rest of the water, and the mixture is ready to spray. Use only the clear liquid. It should be poured into the spraying tank through a strainer. It may be used hot or cold. There are several ready-made sulphur-lime washes which give good results when properly diluted. When mixed 1 part to 14 parts of water they usually correspond in strength to the formula given above.

Arsenate of Lead

Arsenate of lead..... 1 pound
 Water 50 gallons

It is unnecessary to use it stronger. It is more reliable than paris green. It is especially useful where there is much rain. It sticks well and does not scorch. Mix well first with a small amount of water.

BETTER FRUIT

HOOD RIVER, OREGON

OFFICIAL ORGAN OF
THE NORTHWEST FRUIT GROWERS' ASSOCIATION

A MONTHLY ILLUSTRATED MAGAZINE
PUBLISHED IN THE INTEREST OF UP-TO-DATE
FRUIT GROWING AND MARKETING

ALL COMMUNICATIONS SHOULD BE ADDRESSED AND
REMITTANCES MADE PAYABLE TO

BETTER FRUIT PUBLISHING COMPANY

E. H. SHEPARD C. R. GREISEN
EDITOR AND PUBLISHER TRAVELING REPRESENTATIVE

SUBSCRIPTION PRICE \$1.00 PER YEAR
IN ADVANCE IN UNITED STATES AND CANADA

FOREIGN SUBSCRIPTIONS, Including Postage, \$1.50
ADVERTISING RATES ON APPLICATION

Entered as second-class matter December 27, 1906,
at the post office at Hood River, Oregon,
under act of Congress of March 3, 1879.

THE PORTER BILL—The Porter Bill is dead. The universal expression seems to be one of satisfaction throughout the Northwest.

The Lafean House of Representatives Bill, No. 28338, has been introduced into the House of Representatives by Mr. Lafean. It is a substitute for the Porter bill. It has been referred to the Committee on Interstate and Foreign Commerce and ordered printed. That is as far as it has gone up to the present moment, March 12. It is a decided improvement over the Porter bill and has many good points which will be of great benefit to the fruit industry in general. The grading on size and the terms used for the different grades according to size, are much better than the Porter bill. Size A, size B and size C, do not indicate by the wording that size B is inferior to size A. In the Porter bill the expression was standard A, standard B, standard C, indicating that an apple 2¼ inches, 4½ tier, was lower grade than 4-tier apple; but size A and size B does not convey grade impression. We like this point very much. The Lafean bill is full of good points, and a general law is badly needed along the lines of the Lafean bill. It is too bad that the Eastern people do not understand the requirements of the boxed districts embracing the Northwest states, where nearly all boxed apples are grown.

Section 3 calls for a standard box of apples to contain not less than 2,340 cubic inches. We believe every fruit grower in the Northwest will object to the Lafean bill on account of the first paragraph, lines 10 to 18 of section 3, on account of size of boxes. To use this box means to dispense with the present uniformity of pack. Boxed trade wants uniform apples. If the promoters of the Lafean bill will adopt the Winchester bushel instead of the 2,340 cubic inches, and permit growers to pack the sized box they are using and have used for the last ten years, the 10½x11½x18 and the 10x11x20, we believe they can get the entire support of the Northwest. The bill will appear in this issue. Do not fail to read it.

EXAGGERATION IN CROP REPORTS—The manager of one of the largest associations in Colorado criticizes the Northwest for the misrepresentation and the damage innocently done by exaggerated reports of our fruit crops. On account of the estimates published last year, growers sold fruit in

some instances in Colorado for less than market value in advance of the season. Now these exaggerations are of frequent occurrence. There are two causes. Some real estate men and promoters fancy that they are doing a great deal to boost the business by exaggerating the size of the crop. Some growers imagine it gives a district a great deal more prominence to exaggerate the size of the crop. Possibly some notoriety is gained by this exaggerated misrepresentation. It may be of some benefit, but it is only temporary, while the damage that results is very great indeed, for the reason that buyers govern themselves in the prices they offer and pay according to the size of the crops in the different districts, for the reason that there is no way to beat the law of supply and demand; consequently, if these exaggerated reports come out it means that growers get less for their fruit, and there is nothing that hurts a district more than getting low prices for fruit.

We hereby certify that we have printed 10,120 copies of Annual Spraying Number of "Better Fruit," April edition.

F. W. Baltes & Company.

The grower is entitled to market value. If the buyer has exaggerated ideas of supply, the price is less and the grower will suffer. For heaven's sake, let the growers of the Northwest stop this exaggeration and state honestly and truthfully what they believe to be the correct

The last splendid opportunity for clubbing rates on "Better Fruit."

Clubs of four or more will be taken at 50 cents each until June 1. As long as the April issue lasts every member of one of these clubs will get a copy of this Annual Spraying Number. The best spraying edition ever produced by any fruit growers' paper in the world.

amount; and for heaven's sake don't let us say what we are going to have when the blossoms are on the trees. Don't put out reports of what we are going to have until the fruit is set and we know what we are going to have, because when we do we are doing just so much to pull down the market price.

I know of one district which claimed last year they would have 500,000 boxes of apples. This district had 200,000, possibly a little less. I know of a district last year that exaggerated very largely, which affected the market prices. I am told that one of our Northwest states claims to have shipped 4,800 cars of apples last year. While I have not the facts and figures at hand, it is my belief that if the railways were consulted that the combined shipments of apples from Washington, Oregon and Idaho would not amount of 4,800 cars.

◆ ◆ ◆

IN the last ten months "Better Fruit" has produced four 52-page editions, four 56-page editions and one 60-page edition, and the current issue, which is

LESLIE BUTLER, President
J. N. TEAL, Vice President
TRUMAN BUTLER, Cashier

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Incorporated 1905

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Correspondence Solicited

Your Patronage Solicited

72 pages, an average edition of 56 pages. In other words, every subscriber for "Better Fruit" has got an average edition of 56 pages for ten months, at one dollar per year. We have looked over a few horticultural papers. One has 12 pages, seven have 16 pages, one 20 pages, and one 34. Such a comparison must be convincing in showing the subscriber what he gets for his money.

The March edition of "Better Fruit" is devoted almost exclusively to small fruits, and is universally conceded to be the best edition ever published by any horticultural paper pertaining to small fruits in general. One of the oldest and largest fruit papers published, a big annual of 68 pages. "Better Fruit" feels very proud in producing an issue of 72 pages, because "Better Fruit" is only three years of age, and for the reason that other journals have been twenty years in business without being able to produce as large an edition.

This is the largest annual spray number ever produced by any fruit paper in the world. It contains 72 pages. It contains more valuable information on spraying, by expert practical men, than has appeared in the columns of any other fruit journal throughout the entire year. Instead of being worth the price of a subscription, it is worth ten, a hundred, a thousand times the price of the subscription, according to the size of a man's orchard, and yet it costs the fruit grower but one dollar to get it for the entire year.

◆ ◆ ◆

WE believe that this is the best spraying edition ever published by any fruit paper in America. We have articles from the most expert men in this line of business. The greater part of the credit for this splendid spraying annual is due to Professor Gillette, of Colorado Experimental Station; Professor Ball, of Utah Experimental Station; Professor Melander, of Washington Experimental Station, and Professors Cordley and Bradley, of Oregon Experimental Station, and Mr. Hurst.

◆ ◆ ◆

THROUGH the kindness of the Mitchell, Lewis & Staver Company, the Hardie Manufacturing Company, the Friend Manufacturing Company, and the C. H. Lilly Company we are able to produce in this issue exact illustrations of nearly all important nozzles and attachments that are used by the fruit grower in spraying, and we desire to extend our thanks to these firms for their kindness in furnishing these valuable illustrations for the benefit of the fruit grower.

◆ ◆ ◆

WE wish to extend our thanks to the Colorado Experimental Station for kindly furnishing the scientific illustrations of the green and woolly aphids, which are executed with great care and are absolutely true to nature.

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BETTER FRUIT DOES NOT GIVE PREMIUMS—"Better Fruit" is opposed to giving premiums. Every number is worth the price of the subscription and some numbers are worth one to one thousand times the price of a subscription, according to the size of a man's orchard. We want every subscriber to take "Better Fruit" for the merit that is in the paper and for the

value the paper is to the fruit grower. We do not want a subscriber to take "Better Fruit" on account of some premium. Such subscribers are of no value to the publication, because such a subscriber does not care for the paper and does not read it, consequently the paper does no good, the public is not benefited, and the advertiser gets little, if anything, in the way of results from people who

take the paper on account of the premiums offered.

Every subscriber to "Better Fruit" takes it because he is interested in the business and for the value the paper is to him; not on account of any premiums offered, because we give none; consequently our subscription list is a genuine subscription list of merit and one that will get results for its advertisers.

ORCHARD PLANT LICE AND THEIR REMEDIES

Continued from page 20

To make 1-1-2 lime-sulphur mixture, prepare as above using only thirty gallons of water for the fifteen pounds of lime and fifteen pounds of sulphur.

For the 1-1-4 lime-sulphur mixture prepare in the same manner, but dilute to sixty gallons before applying.

Rex Lime-Sulphur—We have found the Rex lime-sulphur in the proportion of one gallon of the Rex to seven or eight gallons of water, to be just about equal in effect to the 1-1-3 home-made lime-sulphur preparation. Rex lime-sulphur solution can be made white by

the addition of lime at the rate of five to ten pounds for each fifty gallons of spray.

Whale Oil or Fish Oil Soaps—The so-called whale oil or fish oil soaps which are quite extensively used for the destruction of plant lice, will usually be effective if thoroughly applied in the proportion of one pound of soap to each six to eight gallons of water. There are numerous brands of these soaps upon the market. Those that we have used quite successfully are Good's Whale Oil Soap and Bowker's Tree Soap.

EXPERIMENTS FOR THE DESTRUCTION OF THE WOOLLY APPLE APHIS

Orchard of	Insecticides	Strength	Treated	Date Used	Examined
L. P. Nissen..	Lime and sulphur.	15, 15, 50.....	Tops and roots...	Nov. 7, 1906	Nov. 19, 1906
	Chloroleum.....	1 to 40.....	Tops.....		Nov. 23, 1906
	Chloroleum.....	1 to 50.....	Tops and roots...		Nov. 28, 1906
	Scalecide.....	5% oil.....	Tops and roots...		Jan. 11, 1907
	Tobacco dust.....	2, 4, 5, 6 and 8 lbs.	Roots.....	Nov. 23-28, 1906	Mar. 15, 1907
	Tobacco stems.....	2, 4, 5, 6 and 8 lbs.	Roots.....		Mar. 25, 1907
	Quick lime.....	10 and 20 lbs.....	Roots.....		June 6, 1907
	Rex.....	1 to 11.....	Tops.....		
	Ker. emulsion.....	7% oil.....		—Mar. 25, '07	
	Tanglefoot.....		As bands.....		
H. D. Smith..	Ker. emulsion.....	22.2% oil.....	Tops.....	Dec. 18, 1906	Summer, 1906
	Ker. emulsion.....	16.6% oil.....	Tops.....		January, 1907
	Ker. emulsion.....	13.3% oil.....	Tops.....		
	Scalecide.....	1 to 19 (5%).....	Tops.....		
	Tanglefoot.....		June as bands		
R. E. Turpen..	Rex L. S.....	1 to 8 with lime...	Tops.....	March 2-22, 1907	Apr. 26, 1907
	Adams L. S.....	1 to 8 with lime...	Tops.....		
	Adams L. S.....	1 to 8 with no lime.	Tops.....		
	Lime and sulphur.	1—1—2.....	Tops.....		
	Lime and sulphur.	1—1—3.....	Tops.....		
	Lime and sulphur.	1—1—4.....	Tops.....		
E. M. Cheedle	Rex L. S.....	1 to 8 no lime....	Tops.....	March, 1907	June 5, 1907
	Tobacco stem decoction.....	1 lb. to 1 gal.....	Tops.....	Apr. 2-6, 1907	Aug. 22, 1907
	Ker. emulsion....	7% oil.....	Tops.....	Mar. 1 to Apr. 6	{ June 5, 1907 Aug. 22, 1907
F. C. Jaquette	Whale-oil soap...	1 lb.—4 gal.....	Tops.....	April 2.....	April 9 to June 7 June 20 May 16
	Ker. emulsion.....	9.4% oil.....	Tops.....	April 2.....	
	Ker. emulsion.....	6% oil.....	Roots and tops...	April 9.....	
	Ker. emulsion....	6% oil.....	Roots.....	June 7.....	
	Checks.....				
	Carbon bisulfid..	3 oz. to tree.....	Roots.....	April 11.....	
B. A. Smith..	Lime sulphur.....	{	Tops.....	Mar. 2 to 6.... Mar. 2 to 6.... May.....	Mar. and May Mar. and May Mar. and May
	Rex & Adams... }				
	Tobacco dust decoction.....	1 lb.—2 gal.....	Tops.....		
	Tobacco dust decoction.....	1 lb.—3 gal.....	Tops.....		
	Ker. emulsion.....	5% oil.....	Tops.....		
	Ker. emulsion.....	6% oil.....	Tops.....		
	Ker. emulsion.....	7% oil.....	Tops.....		
J. Cornetto...	Ker. emulsion....	3, 5, 6, 7, 10, 15, 20, 33, & 50% oil..	{ Roots.....	June 26 to July 2	{ July 22 Aug. 22 and Sept. 13
	Ker. emulsion....	5 and 6% oil.....	Tops.....		
	Black Leaf.....	1 to 50.....	Roots.....		
	Black Leaf.....	1 to 66.....	Roots.....		
	Black Leaf.....	1 to 75.....	Roots.....		
	Tobacco dust.....	{ 1 lb. to 1 gal... 1 lb. to 3 gal... 1 lb. to 5 gal... }	Roots.....		
	Tobacco stems....	2 lbs.—1 gal....	Roots.....		
	Tobacco stems....	1 lb.—1 gal....			
	Tobacco stems....	1 lb.—3 gal....			
	Tobacco stems....	1 lb.—5 gal....			
	Tobacco stems....	6 lbs. per tree....	Roots.....		
	Scalecide.....	1-40, 1-60, 1-50..	Roots.....		



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and Load Controller**

can be applied to any style power sprayer. It takes the load off from the engine and pump. Saves fuel. Lightens traction. Best thing out. For information write to

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Guaranteed to kill every scale it hits when applied at strength of 1 to 20. More economical than home made remedies.

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District Mgr., W. H. ADDIS, Portland, Oregon



This picture represents "OLD 56" the grandmother of our

**QUEEN
QUALITY
LAYERS**

now six years old. At three years she layed 49 eggs in 64 days. She is as good a hen in standard as in utility points. Hens from which

WE SELL EGGS FOR HATCHING
are bred from proven layers, good, typical, vigorous birds, and will produce chick that will please you if you want

WHITE PLYMOUTH ROCKS
15 Eggs, \$2.00 35 Eggs, \$4.00 100 Eggs, \$8.00
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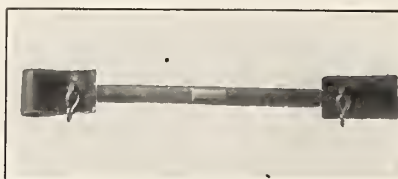
Cupid Flour

Has same standing in the Flour Trade that Hood River Apples have in the Fruit Trade. *Made by*

**HOOD RIVER
MILLING CO.**

PATENT TREE FENDER

The accompanying cut is the only invention in whiffletree fenders; patented, December 1, 1908. It is a well-known fact that whiffletrees injure fruit trees by removing the bark and oftentimes



scarring the trees as the horses are driven through the orchard in plowing or cultivating. The object of my invention is to provide simple and efficient means for preventing the outer ends of the whiffletrees from skinning or bruising the trees. Every fruit grower buys them on sight. The retail price is \$1.00 per pair; wholesale, \$9.00 per dozen. Manufactured by C. H. Smith, Freewater, Oregon.

NEELY & YOUNG (INC.)

Real Estate, Reclamation, Development.
Spokane, Washington, February 18, 1909.
Better Fruit Publishing Company:

Dear Sirs—We have gone through your recent number of "Better Fruit" whenever spare moments would allow, and wish to congratulate you on this number. "Better Fruit" is always good, but this last issue, so far as the entire Northwest is concerned, is certainly a good one.

I doubt, however, if the general public appreciates what you have done and are doing, but that is a matter of education, and from month to month and from year to year you will be able to increase your standing if you proceed along the lines you have followed since I first became acquainted with your paper.

Some people take things as they come and as a matter of course. They do not seem to realize that it takes an immense amount of energy, time and money to accomplish what you and our local chamber of commerce are doing, but we are gradually educating them and hope to, at some time, bring them all into line.

We trust that our relations will always be friendly, and that some time in the not too distant future we can prevail upon you to issue "Better Fruit" with the Spokane address to it.

Yours truly, H. J. Neely.

HEADQUARTERS FOR CENTURY SPRAY PUMPS

Hose, Nozzles, First-
class Plumbing Supplies

C. F. SUMNER
Successor to Norton & Smith
HOOD RIVER, OREGON

St. Helens Hall

Portland, Oregon

**A GIRLS' SCHOOL OF
THE HIGHEST CLASS**

CORPS OF TEACHERS, LOCATION,
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LICENSED EMBALMER

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*Furniture, Rugs, Carpets
and Building Material*

Hood River, Oregon

Young Men Wanted

WE wish to confer individually with a large number of young men who have a common school education and who are physically fit. Only those desiring to enter the railroad service need apply.

Address School Telegraphy

HIERNIA BUILDING

Market and Jones Streets, San Francisco

Upper Hood River Valley

Cheap and the best of land. Plenty of water for irrigation at low rates. Good transportation facilities. You are cordially invited to see what I have done at my home in six years. I handle these lands.

W. H. MARSHALL
Dee, Oregon In Hood River Valley

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DOCTOR OF OPHTHALMOLOGY

EYES TESTED  LENSES GROUND

Over 30 Years' Experience

TELESCOPES, FIELD GLASSES
MAGNIFIERS TO EXAMINE SCALE

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The Hall Drug Store

EASTMAN KODAKS AND SUPPLIES
Souvenirs, Postcards, Stationery
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*Hood River's Largest and Best
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Oregon Box & Mfg. Co.

Portland, Oregon

MANUFACTURERS OF

**SPRUCE
BOXES
DRIER TRAYS**

Write for price before placing your order

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Lumber Co.**

WHOLESALE AND RETAIL

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Lath, Shingles, Wood, Etc.

Hood River, Oregon

**VEHICLES
AND AGRICULTURAL
IMPLEMENTS**THE BEST OF
ORCHARD AND GARDEN TOOLS
A SPECIALTY**J. R. NICKELSEN**
HOOD RIVER, OREGON**A Trip to the Coast**Is incomplete without a ride
on the**Mt. Hood Railroad**By Mountain Streams, Apple Orchards
Virgin Forests and Snow
Capped PeaksConnects with O. R. & N.
at Hood River, Oregon**GROWERS—BE CAREFUL**

Do not let some well meaning but misguided theorist lead you astray. Here are a few facts for your consideration. You have been told that you must use a coarse spray in order to reach the inner calyx chamber. That's theory. The fact is, that all Niagara turned against the blossom end of the fruit prospect will not reach the inner chamber as quickly as a fine particle of solution that is driven with such force that it slides through the small openings without the air bubble resistance that the large drop meets, for this completely plasters over the opening without effecting an entrance.

The first necessity is to have power behind the nozzle. The source of this power is obtainable in every state in the union. All inferior shut-offs must be discarded and an unobstructed passage must be had between the pump and the nozzle, eliminating all unnecessary resistance. Now, in order to drive this fine spray into the calyx it is necessary that the nozzle should be designed with this thought in mind.

In order to make rapid progress a given number of gallons must be handled in a given time, naturally depending on the class of work. The old nozzle clusters are worthless, because they cannot project the fine spray as far or as forcefully as the single pattern. These single Vermorel type nozzles have been condemned by some professors who are advocating the nozzle that flows a flat spray (claiming more force), and, therefore, a deeper penetration into the calyx chamber. Their opinions are too often based upon facts. It is true that the majority of Vermorel type nozzles upon the market today do not meet the four important requirements, viz., fineness of spray, evenness of distribution, the desired amount of solution from one discharge orifice, and, lastly, penetrating power or projectiveness. Reasons for this are plainly understood when the construction of the various types of nozzles is examined. Their feeder apertures are either too large or too small. They are either too slanting or too straight. They are either too close or too far from the discharge orifice. The eddy chamber is either too deep or too shallow, or too large or too small. The speed of the rotation of the solution in the eddy chamber is invariably too slow. The discharge orifice is usually too small to allow projectiveness. To enlarge the discharge orifice of a nozzle that is mechanically otherwise imperfect only condemns the whole principle, as a lifeless coarse spray is produced. There are fully as many secrets in the construction of spray nozzles that determine their action, as in fruit growing or even the pastimes of Burbank.

Gentlemen sitting at office desks, designing spray nozzles, are poor authority for fruit growers to be at the mercy of while they have thousands of dollars' worth of fruit prospects depending on the manufacturer of spraying outfits and their appliances. A good man to listen to for advice is one who knows he knows what he is talking about. It's the men who are getting results who can give fruit growers good advice. The writer of this article is indebted to the "Friend" Manufacturing Company, Gasport, N. Y., for the following letter which they received from the Underwood & Viles Cold Storage Company, of Hutchinson, Kansas, on March 15, 1908:

"Yours of the 29th ult. received, also the one-half dozen nozzles by mail, and will state that our boys say that these are the finest nozzles they have ever used. We will ask you to send us two dozen (24) more by express as soon as possible. We enclose draft to cover bill of February 29th. Please bill these two dozen nozzles to us at your very lowest price. Yours very truly,

"Underwood & Viles Cold Storage Co."
It is evident that these prominent fruit growers were pretty well pleased with the "Friend" nozzle, as they write now under date of February 19, 1909, ordering twenty-four (24) Regular, Straight Pattern Nozzles, and twenty-four (24) "Friend" Angle Nozzles, for use on their outfits.

The up-to-date fruit growers who have used this nozzle are ordering more of them. The Angle Nozzles are especially attractive. The advantages of the Angle are that they spray up and down and at either side, at the will of the operator. The price charged for either type is \$1.00 each. The Company guarantees their satisfaction. Recent tests at Cornell University, during Farmers' Week, disclosed the above mentioned facts. A Spravograph, designed and constructed by Professor Riley, director of farm mechanics, was used in making the test. The writer witnessed these tests. It was there that the strong impressions in favor of these two nozzles were strengthened. An investigation into how these nozzles are so much superior to others, and how it is that the manufacturers of them are so successful in making them meet the requirements as they do, discloses the fact that, living as they do in the heart of the Niagara fruit belt, devoting their whole undivided attention, as they do and have done for many years, to studying the requirements of fruit growers along this line, enables them to take the lead in these matters. The manufacturers are perfectly reliable and will meet their claims with a guarantee of satisfaction. John C. Hull, Gasport, N. Y.

◆ ◆ ◆

THE freight rate on power sprayers from the East, we are informed, is now just one-half what it was a few months ago.

**SLOCOM'S
BOOK STORE****Office Supplies
Stationery**

Ledgers, Journals, Time Books

Memorandum Books

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**ORCHARDIST
SUPPLIES***Of Every Description*Tarred Rope, Pruning Shears,
Thinning Shears, Nozzles,
Budding Knives, Pruning
Knives, Pruning Saws**E. A. Franz**Hood River
Oregon*Things we are Agents for*

KNOX HATS

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CLOTHING

DR. JAEGER UNDERWEAR

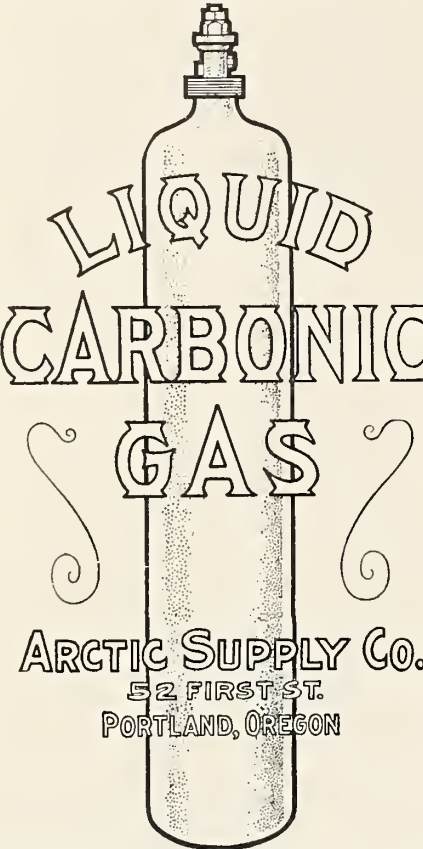
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The PARIS FAIR*Hood River's Largest and Best Store***DRY GOODS
SHOES, CLOTHING**We are offering some extra specials in
our Clothing Department. Ask to see themTry a pair of American Lady
\$3 & \$3.50 Shoes or American
Gentlemen \$3.50 & \$4



**LIQUID
CARBONIC
GAS**

ARCTIC SUPPLY CO.
52 FIRST ST.
PORTLAND, OREGON

Saves the labor of one man in
spraying and does better work

ADVANTAGES OF CEMENT PIPE FOR IRRIGATION

AS ADOPTED AND NOW IN USE BY THE VERA LAND COMPANY IN THE SPOKANE VALLEY. BY J. W. STRACK, CIVIL AND IRRIGATING ENGINEER, SPOKANE

In view of the progress made in the past year by developing and irrigating the Vera lands, your company stands to be highly congratulated in making your own cement pipe for your general distributing system; thereby adapting the most up-to-date and modern plan for irrigating where large tracts of land like the Vera tracts are to be supplied with water for perpetual use.

While I realize from an engineering and financial standpoint of view, conditions differ, yet, if the Spokane Valley is to be supplied with water for all time, there can be but one conclusion—cement pipe will prove to be the most economical. No material gets better with age except cement. Unlike iron or wooden pipe, while there is no alkali in the Spokane Valley, alkali soil water has no effect on cement.

When the value of cement pipe for low pressure mains (up to 30-foot head) becomes thoroughly understood, I believe it will come into general use throughout all irrigated districts in this state, for the reason that the cost of wooden flume maintenance and final short life of same will prove to be very unsatisfactory, and the primitive method of conducting water by means of long open ditches subject to great loss by seepage and evaporation, the rank growth of weeds along ditch lines where gophers harbor and whose runways add still more to the loss of water. The flow of water thus diminished being generally insufficient to irrigate the land causes additional loss of crop.

Under a high state of cultivation this land becomes very valuable, and the land taken by ditches and embankments, generally ten to twenty feet wide (depending on size of ditch), is also an item to be taken into account. A ditch generally follows the irregular contour of the ground, thereby cutting up the land in bad shape and destroying its beauty and furnishing a breeder for weeds, the seeds of which are most always allowed to mature and scatter broadcast by winds, adding a great amount of labor to each tract of land.

While I concede the first cost of installing cement pipe to be greater than wooden flume, open ditch or wood pipe, the cost of maintenance replacement, loss of water, etc., makes cement pipe the cheapest at the end of five years, and since cement pipe improves with age, the pipe will be better at the end of five years than when it was first installed.

The pipe should be laid below frost line, or at least sufficiently deep so as not to interfere with the operation of agricultural implements.

Since the successful future of the irrigated lands of Vera has been fully established, I highly endorse the work of installing cement pipe already in place, and recommend that your company put in cement pipe for all delivery mains, thereby doing away almost entirely with the large cost of maintenance.

**MONARCH STEEL
STUMP
PULLER**



Pulls stump 7 feet
diameter. Only
Steel Stump Puller
Factory in the
world making their
own Steel Castings.
Guaranteed for
500 horse power

strain. Catalogue and discounts. Address:

Zimmermann Steel Co., Lone Tree, Ia.

GENERAL AGENT FOR OREGON
W. M. KOLLOCK HOOD RIVER, OREGON

OLDEST LIVERY COMPANY IN
THE VALLEY

**TRANSFER &
LIVERY CO.**

Special Attention to Commercial
Men, Camping & Fishing Parties

TELEPHONE MAIN 131

HOOD RIVER, OREGON

Apple Storage

ST. LOUIS is the best local market and distributing point to ship your apples, and hold on cold storage, for highest winter prices.

OREGON, WASHINGTON & IDAHO
Fruit Associations, Growers & Shippers

I solicit your carload shipments of box apples this fall for cold storage here. Will advance freights and pay insurance, charging usual commission and interest.

Storage rates 15 cents per box for season ending May 1.

Only Extra Fancy Fruit wanted.

I do business with the Mound City Ice and Cold Storage Company, the largest and most modern apple storage house in the middle West. Cars unloaded direct into coolers.

F. S. Timberlake

3019 North Broadway Street
St. Louis, Mo.

Bank and other References

CAPITAL STOCK \$100,000 SURPLUS \$20,000

**FIRST
NATIONAL
BANK**

HOOD RIVER, OREGON

F. S. STANLEY, President
E. L. SMITH, Vice President
E. O. BLANCHARD, Cashier
V. C. BROCK, Assistant Cashier

ASSETS OVER \$325,000

Savings Bank in connection



When you get to Hood River
stop at the

**MT. HOOD
HOTEL**

Trains stop directly in front of
Hotel. ☞ Bus meets all boats

Automobile Service Daily for
Cloud Cap Inn During Months
of July, August and September

POULTRY on a FRUIT FARM

Write for Special Information regarding Our Poultry Foods, Rations, Remedies and Supplies

LILLY'S BEST

Largest Manufacturers of Poultry Supplies on the Pacific Coast

Practical chicken men universally concede
OUR LEADERSHIP

SPECIAL ATTENTION to Fruit Specialists who are Amateur Poulterers

Write for our Poultry Book

The Chas. H. Lilly Co.
SEATTLE PORTLAND

A. C. SHAW

Home Phone 3

ROY F. DEAN

Electric Wiring and Supply Co.

Hood River, Oregon

LETTER OF M. C. MILLARD

Chippewa Falls, Wis., February 20, 1909.

Messrs. Lewis & Snyder, 503 Sprague Avenue, Spokane, Washington:

Gentlemen—I take pleasure in telling you of my experiences and the impressions I received during my recent trip through the fruit belts of the State of Washington.

I left here early in January and went immediately to Spokane, Washington, which, I had been told, was the headquarters of a large number of companies handling fruit lands and which were installing plants for irrigating the land.

I called on a number of concerns in Spokane, including yourselves, the Richland Land Company, who handle lands at Richland, Washington, the Co-operative Realty Company, with lands at Kennewick, the Sunnyside Land Company, who have lands at North Yakima, Washington. I was very cordially treated by all of these concerns, and upon their various invitations visited their propositions.

I went to Wenatchee and carefully looked into their project and methods. Then to North Yakima, and afterwards to Kennewick and Richland, on the Columbia River. I could not decide definitely on any of these as the place for my future home, and at last decided to return to Spokane and look into the possibilities which the Spokane Valley was said to hold forth to the prospective fruit grower.

I called, as you will remember, at your office, and was very courteously received. On stating that I desired information regarding Vera Irrigated Tracts, which I had previously seen extensively advertised, you showed me your plats and maps, explaining comprehensively and in detail all about this property.

After talking the matter over, upon your invitation I was taken to see these tracts and the adjoining land, in your large automobile. After leaving your office I remember that we went east on Sprague Avenue. This is one of the finest drive-ways leading to and from Spokane, level and hard, with no dust. It occurred to me at the time that Sprague Avenue, from the district east to Spokane, was a perfect thoroughfare, over which a light wagon fully loaded could be drawn by one horse. There are no hills on this roadway.

It seemed to me but a very few minutes until we arrived at Opportunity, which lies just east of Spokane. Here I noticed orchards which have been set out for some time, and which, I was informed, have caused the value of the land to increase very rapidly in a short time. I was also told that there is no cheap property between Spo-

Superintendent Wanted

We wish to engage the services of an experienced and competent horticulturist to manage an eighty acre apple orchard for the coming season. State salary demanded, experience and reference.

Address Box E, Union, Oregon

1909 100 pages of most interesting information about

SEED Flowers, Vegetables, Bulbs, Field Seeds, Grains, Grasses, Plants, Shrubs, Garden Supplies, Poultry Supplies, Fertilizers, Sprays

CATALOGUE Twenty years experience in seeding the Pacific Northwest speaks to you in this our very latest

PORTLAND SEED CO

CULTURAL DIRECTIONS PREMIUM OFFERS
JUST OUT—Write for it—Ask for No. 200

PORTLAND SEED CO

Portland, Oregon—Spokane, Wash.

KIMBALL CULTIVATOR

PRICE \$16

F. O. B.

Is the one to use in all feet wide, very easy to which prevents striking No hoeing of trees where used on it in orchard, fern, pink, sorrel, oats, thistle it has no equal

orchards. It is 8½ guide, has a fender the tree with knife. used. Two horses or for destroying briars and Canada



In using this implement the driver will stand in center of board, over knives, and to guide it will step to right or left, as occasion requires, and if anything should catch or gather on the knives the driver will step forward on draft board, tilt the handle forward, raising the knives, so that anything that has gathered on them may free itself. Keep all of the burrs tightened, and should any of the knives get bent out of shape force them back to place without removing them from the frame.

Weber & Johnston, The Dalles, Oregon
Sole Agents for Eastern Oregon, Washington, Idaho

R. E. HARBISON

We make them of every description

BOXES

A. L. NEWTON

Made of odorless White Fir

The kind that helped to make Hood River famous. Used by the best trade. Write for prices

HOOD RIVER BOX CO.

Formerly owned by the Davidson Fruit Co.

HOOD RIVER, OREGON



Prepared Spray Mixtures

OUR Spray Mixtures are always ready for use by adding water. They are the best and cheapest—no dirt nor bother in mixing; no waste; thousands of pleased customers.

Catalogue describing fourteen different prepared Spray Mixtures, also Spray Pumps and Canning Outfits manufactured by us, and illustrations of various insects and pests, which are so destructive to fruit and vegetable crops, mailed free.

QUINCY SPRAY MIXTURE CO., Box 221-B, Quincy, Ill.



**RHODES DOUBLE CUT
PRUNING SHEAR**

Pat'd June 2, 1903.

**RHODES MFG. CO.,
GRAND RAPIDS, MICH.**

THE only pruner made that cuts from both sides of the limb and does not bruise the bark. Made in all styles and sizes. We pay Express charges on all orders.

Write for circular and prices.



Read What They Say at **PULLMAN COLLEGE**
RIGHT HERE IN THE PACIFIC NORTHWEST ABOUT

EAGLE BRAND ARSENATE of LEAD

FAR SUPERIOR IN
DESIRABLE PROPERTY

Pullman, Wash.,—More striking differences were observed in the tendency of the compounds to remain suspended in water or to settle quickly when mixed with water. Its ability to stay in suspension, a property very desirable for spray purposes, the Eagle Brand is far superior to any of the others. This was even more noticeable after longer standing. (Report shows the proportion was 10 to 1).
B. W. THATCHER, Station Chemist.

WE ADVOCATE ITS USE
AT EVERY OPPORTUNITY

Pullman, Wash.,—Eagle Brand Arsenate of Lead has given better results than any of the other brands of arsenate that we have tried. The differences have been so marked that I do not hesitate to recommend your brand to anyone inquiring. Gives entire satisfaction in controlling Codling Moth as well as other insect pests and we are advocating its use at every opportunity.
A. L. MELANDER, Entomologist.

Eagle Brand adheres to foliage forming a thin film which is not easily washed off by rains, and therefore does not require repeated applications involving much expense. It is particularly well suited for spraying tender foliage because it does not scorch even when applied in strongest solutions. It remains in suspension a long time without requiring constant agitation.

For information, folder and prices address the great Seed and Supply House. Also write for Spray Book

THE CHAS. H. LILLY CO., SEATTLE AND PORTLAND

Pacific Seed Co.

201-203 Front Street

PORTLAND, OREGON

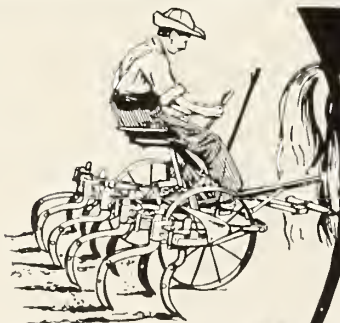
SEEDS

TREES

PLANTS

SPRAYS

PUMPS



Planet Jr.

The Planet Jr. Orchard and Universal Cultivator does more work and does it better than any other implement for the same purpose. Carries attachments which thoroughly cultivate, furrow and hoe at any required depth in orchard, vineyard, or hop-yard. Equipped with side-hitch and fruit-tree shield. Can be made into a disc cultivator. Made by a practical farmer and manufacturer, and especially adapted for your work. Thousands of Planet Jr. Cultivators are in successful use in California and other fruit-growing districts.

We carry stock in San Francisco. Agencies in all principal Pacific Coast cities. Write for name of nearest agent.

Write today for our new 1909 catalogue of 45 kinds of Planet Jr. implements for every farm and garden use.

S. L. Allen & Co., Box 1106U, Philadelphia, Pa

kane and Opportunity, and that it is all worth a good figure.

Just east of and adjoining Opportunity we came to the Vera tracts, which property I had come out to see. As I was looking for information and designed to be enlightened on the questions of fruit raising and irrigating projects, I looked into the proposition very carefully as it was being worked out at Vera.

The two huge pumping stations on the property were examined very carefully, and I firmly believe they are sufficiently large to supply the amount of land under irrigation with ample water. Each of these pumps is capable of forcing five thousand gallons of water per minute through the large cement pipes. There is a plant on the property where these pipes are made. From inquiries which I had made of an irrigating engineer, I learned that these cement pipes were much better than wood or iron, in that they improve with age, whereas wood and iron pipes will rot and rust away. I am fully convinced that the manner of conveying the water over these tracts is the proper method, for there is no waste by seepage or evaporation as there is where the open ditch system is used. The use of these cement pipes, I learned, being laid below the frost line, does away with the rank growth of weeds which invariably spring up along such open ditches.

The water tower, used as a storage for water for domestic purposes, is large, and has a capacity sufficient to supply the needs of the people who build there. Water is furnished under heavy pressure, so that it is possible to have running water and bath in each house.

Telephone service is in use for the people at Vera, being an extension of the Spokane line. Electric lights are also installed, and there is daily mail, meat and grocery deliveries. The Coeur d'Alene Electric Line, from Spokane to Coeur d'Alene, runs but a short distance north of Vera. During my visit in and around Spokane, work on the Sprague Avenue extension of the Spokane Traction Company's line had been discontinued, but it was stated to me that as soon as weather conditions permitted, the work would be actively resumed and pushed to completion. This line had been completed for two and one-half miles, and will run through the center of the Vera tracts.

I am sorry that I was unable to see the country embraced in the Spokane Valley during the growing season, but I gathered figures from a number of parties who reside in this valley, east of Spokane. I learned that the cost of apple trees one year old, from the nurseries, was \$12 per hundred; the cost of planting from ten to thirty cents each; the total cost of taking care of the trees for the first four years, including disking, harrowing, pinching of shoots, cultivating, pruning,



U.S. Government Irrigation Projects

Water thousands of Acres, but there are thousands more above the ditch which can be reclaimed

by the **Columbia Ram**

utilizing a small fall from ditch lateral or creek. The battery of Columbias as shown above irrigates about 240 acres of Grand View Hill, at Sunnyside, Washington.

If interested write for particulars

DEPT. B

Columbia Steel Co.

148 N. 10th Street, Portland, Oregon

etc., was \$37 an acre; for preparing land, furnishing trees and planting, \$30 an acre. I also learned that apples yield from two hundred to two thousand boxes to the acre, and sell at from 75 cents to \$2.50 a box.

Upon inquiry I learned that market or truck gardening can be carried on profitably during the period when the apple trees are coming to the bearing point, by planting between the rows of trees. The fact that Spokane offers such an excellent market for garden produce did much to cause me to decide in favor of Vera as against the other tracts I visited. I engaged in truck gardening a number of years ago in Iowa, but my market at that time was very small and limited. The fact that Spokane has doubled its population in the past five years and is rapidly growing, clearly shows me that there will always be a good demand and at high prices, for all produce raised near that city.

Upon investigation I found that asparagus is a good seller and yields abundantly; that the returns are from \$200 to \$500 an acre. String beans, celery, cabbage, sweet corn, cantaloupes, onions, carrots, potatoes, tomatoes, squash and pie pumpkins grow in large quantities and sell at good prices.

After carefully weighing all the facts and figures above, as presented to me, and thoroughly

going over the proposition in every detail, I finally made up my mind to locate in the Spokane Valley, and selected Tract No. 24 at Vera, at a price of \$375 per acre, or \$3,750 for the ten-acre tract. I enclose herewith draft to cover first payment, as agreed. This tract I chose for the reason that it is but one block from the electric line and close to the new \$12,000 schoolhouse.

I feel highly elated over my good fortune, as I consider it, and can heartily and sincerely recom-

mend Vera Irrigated Tracts in the Spokane Valley to anyone looking for the ideal fruit and vegetable raising locality, where a perpetual water right is furnished, insuring your crops against failure, be the weather what it may.

Having decided to throw in my lot with you Western people I shall move to my new home in a short time, and if there is anyone in this section who may write to you and you care to refer them to me, I will gladly give my opinion of Vera.

Yours very truly, M. C. Millard.

THE DALLES BOX AND LUMBER CO.

**Doors, Sash, Millwork
and Building Material**

**FRUIT BOXES and
BERRY CRATES
CAR LOTS A SPECIALTY**

P. O. Box 21

Correspondence Solicited

Factory: The Dalles, Oregon

SOW GOOD SEEDS

Largest Seed House in the West

LILLY'S BEST SEEDS



Established 1885

Send Now
For Free
Catalog

"I am sending you two views of my exhibit at the Lewiston-Clarkston Fair which took first prize. Hope you have read some of the nice things said about the display. We took first on Garden Truck. No doubt Mr. Newton, Secretary, has so notified you. I made a special of an acre exhibit. I can safely say that it takes a lot of my time since the fair showing the many that come how I have my acre planned. I had your card on my exhibit, showing that the seeds came from you. Yours truly, J. W. LIPE, Clarkston, Washington."

THE CHAS. H. LILLY CO., SEATTLE AND PORTLAND

PINE BOXES

*BRIGHT, LIGHT FRUIT BOXES FROM
THE FAMOUS KLICKITAT PINE*

Our new plant can fill your orders promptly and satisfactorily and save you money. Send your specifications and ask for prices

Klickitat Pine Lumber Co.

Portland Office:
26 Concord Building

GOLDENDALE, WASH.

The EMPIRE



We would like to have every reader of this ad. see our 1909 catalogue. It gives the most complete line of cream separators ever placed before the public. We have fourteen styles and sizes to choose from. Our prices are lower than other standard makes. Our machines are made of the best material and by the most skilled workmen, and are fully guaranteed. The Empire is a machine that pleases; it satisfies the most critical; it combines all the essential points that go to make up a first-class machine. Send for catalogue today

Empire Cream Separator Co., Ltd.

94 North Sixth Street PORTLAND, OREGON

The Hood River Electric Light, Power & Water Co.

DOING A GENERAL ELECTRIC
LIGHT AND POWER BUSINESS

TWENTY-FOUR HOUR SERVICE

City Water Works System for Domestic and Municipal Use.
Are prepared to furnish 3000 Horse Power, either
Electric or Water, at Reasonable Rates

General Office, HOOD RIVER, OREGON



WRITE US FOR PRICES ON

DRAIN TILE

All sizes from 3 to 24 inches. In small or carload lots. Also

Sewer, Chimney, Water and Culvert

Pipe, Pipes for Septic Tanks, Etc.

ALL OF OUR CLAY PRODUCTS ARE OF THE VERY BEST QUALITY

Oregon & Washington Sewer Pipe Co.

41 NORTH FRONT STREET

PORTLAND, OREGON

FRUIT GROWERS, YOUR ATTENTION!

Royal Ann, Bing and Lambert cherry trees; Spitzenberg and Newtown apple trees; Bartlett, Anjou and Comice pears, and other varieties of fruit trees

A. HOLODAY

MONTE VISTA NURSERY
SCAPPOOSE, OREGON

TOKAYS TOKAYS TOKAYS

One-half million Tokay Grape vines and large stock of other varieties. Also Logan, Phenomenal, Himalaya Giant, Mammoth Blackberries, Crimson Winter Rhubarb and General Nursery Stock. *Agents wanted* **CHICO NURSERY CO., Chico, Cal.**

420 Acres Devoted to Nursery Purposes

THE WOODBURN NURSERIES

Established 1863 by J. H. Settlemier

Grower of Choice

Nursery Stock

F. W. SETTLEMIER

WOODBURN, OREGON

PARKER HEIGHTS NURSERY

We offer fruit trees of standard varieties, propagated from clean, productive stock, for the family orchard or commercial planter; guaranteed fine and true. Send for list and let us know your wants. Large stock, carefully grown. Satisfaction assured.

H. E. Angel, Proprietor, Wapato, Wash.

CLARK'S SEEDLING

The Strawberry Plants to Grow for Profit

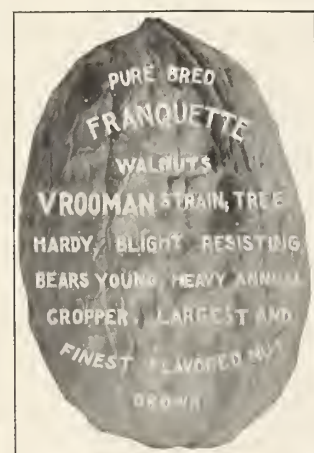
1,000,000 PLANTS FOR SALE

FOR PRICE AND FURTHER INFORMATION ADDRESS

A. WHITEHEAD

HOOD RIVER

OREGON



SALESMEN WANTED FOR NEXT SEASON

Next Year Will See

More Fruit Trees planted than last year. The same is true of the **Drooman Pure Bred Franquette WALNUT TREES**

The demand for this famous Walnut is growing in proportion as people learn its real merits. It is recognized as the *best* on the market because it is *hardy*, bears regularly and produces heavily. The *nut* is large and well filled with rich oily meat of superior flavor. This Walnut commands the highest price on the market just as do choice apples or pears. If you are interested in Walnut culture send for our **FREE BOOKLET** on this subject.

Oregon Nursery Company

SALEM, OREGON

A NEW SPRAY MIXTURE

In England there has been evolved a spray mixture that claims all the qualities going to make up a perfect product. William Cooper & Nephews, of Berkhamstead, England, the old-established house of sheep dip fame, are the perfectors of this spray fluid. This firm is an old one, with a reputation that gives a great deal of weight to their statements and would seem to preclude their making claims they are unable to substantiate.

They have perfected what they term a Winter Spray mixture, which they have named V1 Fluid. It is an altogether new departure in science, and results from its use are a revelation as to what can be done in the way of cleaning orchards.

They also make a Spring and Summer mixture called V2 Fluid, which kills scale, aphids and psylla without injury to leaf or blossom; a perfect insecticide for summer use.

It is claimed these fluids will destroy, completely and infallibly every time, red spider and other mites, mussel, oyster, San Jose, brown and other scale, white wooly scale, snow and froth flies, peach, apple, plum and currant aphids, mealy bugs, blight, apple sucker, lichens, mosses, fungi, including apple and pear scab (black spot), brown rot, canker, rust, moulds and mildew.

Of course, all commercial fruit growers recognize the importance of spraying, or rather the absolute necessity of it. Still, all are anxious to put as little time and money into the work as possible; desiring to be business-like enough to keep the expenditure of time, labor and money to

WE INDORSE SCALECIDE

as the best Spray for PACIFIC NORTHWEST Fruit Trees. It kills **San Jose Scale**, all Soft-Bodied Insects and Fungus. Write for Booklet No. 204 and for **FREE SAMPLE**

PORTLAND SEED CO. PORTLAND, OR.
Sprays Fertilizers Horticultural Supplies

Yakima Valley Nursery

Incorporated

\$60,000 Fully Paid

LARGEST STOCK OF FRUIT TREES

in the Pacific Northwest.
Special prices for large planters. *Salesmen Wanted Everywhere*

W. D. INGALLS, *President and Manager*

NORTH YAKIMA, WASHINGTON

The Sunnyside Nursery Company

INCORPORATED
LARGE AND COMPLETE LINE OF NURSERY STOCK

We will have ready for the market for fall or spring trade 200,000 each of Spitzenberg, Winesap and Yellow Newtown. In fact, about 1,000,000 trees of staples. We have the largest stock of Winter Banana apples in the West—stock from a famous orchard in Wenatchee. This is the coming commercial apple. We can handle your order, no matter what the size. Write to us at Sunnyside, Washington, for prices. Nurseries at Sunnyside, Grandview and White Bluffs.

the minimum. Hence, the progressive commercial fruit grower is one who not only desires but must keep in touch with all that is being done to solve this problem. He is willing to listen to people of standing, who have practical ideas for his consid-

Milton Nursery Co.

MILTON, OREGON

Specialties for 1908-9—Pear and Cherry Trees
Two-year-old Cutleaf Weeping Birch, Maples, Elms,
Snowballs, and a good stock of all other shades and
ornamentals listed in catalogue. *Send for it.*

Burpee's Seeds that Grow

140 VARIETIES ANY QUANTITY

Plenty of Stock in our 40,000 Pounds

Growing Plants as Season Requires

All Makes High Grade

Pruning Tools

Garden Tools

Hose and Spray Nozzles

International Stock and

Poultry Food

International Remedies

Incubators and Brooders

Everything for Building

Everything for Furnishing

Stewart Hardware & Furniture Co.

22,000 feet floor space HOOD RIVER, OREGON

eration. Therefore, the announcement of William Cooper & Nephews, who, through their representative in the United States, place their product before the fruit growers of this country, will naturally have their thoughtful consideration. These products are the result of the scientific investigation of specially trained expert members of their house, in co-operation with Mr. Walter E. Collinge, M.Sc.F.E.S., etc., as head of the Department of Economic Zoology in the University of Birmingham, the foremost authority on insecticides and fungicides in Great Britain.

The history of the V1 and V2 Fluids is an interesting one, inasmuch as it illustrates the fact that two separate and independent investigations not infrequently lead to identical and simultaneous conclusions. Mr. Collinge had undertaken a thorough research with the object of producing a spray fluid which should kill with absolute certainty the eggs of all insects and mites and the spores of fungi. Having arrived at a certain formula, he found that the Cooper Research Laboratory had been engaged in similar experiments, the outcome of which was an almost identical preparation.

This fact is recorded in Mr. Collinge's "Fourth Report on the Injurious Insects and Other Animals Observed in the Midland Counties during 1906," page 7, where the author states: "Early in the present year I found that the Cooper Research Laboratory were working at the subject of insecticides, and experimenting with a fluid of a somewhat similar character. I also found that they had overcome the difficulties of combining the various chemicals which it was necessary to employ in the manufacture of this fluid, so as to bring out its maximum insecticidal power without injury to the trees." He also says: "The mechanical and chemical processes which it is necessary for the chemicals to undergo are somewhat complex, and demand the possession of considerable chemical knowledge; they would also involve the erection of a plant of prohibitive cost to the fruit grower."

Points to be noted about V1 and V2 Fluids are, that they are highly concentrated, are non-poisonous, are instantly soluble in cold water, are harmless to the trees, are easy to use, do not corrode or clog the nozzle, the solution being clear

True-to-Name Nursery

OFFERS TO PLANTERS

Have only a few Delicious left for spring offering. Will have my usual supply of Yellow Newtown, Spitzenberg and a few other leading varieties for Fall 1909.

H. S. GALLIGAN

Phone Home 2002K Hood River, Oregon

ARE YOU PLANTING TREES

Write at once concerning your wants

We are selling out fast. Can still supply some of the best standard sorts in all varieties. Stock is dormant, thrifty, well rooted and will give perfect satisfaction. It is not too late to plant. Don't delay. Write us now and secure the trees and vines you need.

PLACER NURSERIES

(Established 1878)

THE SILVA-BERGTHOLDT CO.

105 Orchard Street Newcastle, California

SPECIAL OFFER 100,000 ONE-YEAR APPLE JUST TO FURTHER ADVERTISE THE WINFIELD NURSERY TREES

The Winfield Nursery Company's "Quality Trees" are almost as cheap as common nursery stock. Why plant trees regarding the propagation of which you know nothing? Trees propagated in a haphazard way from third or fourth class unsalable stock or from scions cut from the nursery row for a series of years cannot give best results. **Why breed cattle to butcher in two years from thoroughbred stock, but buy apple trees by chance to grow for thirty years?**

Apple Trees Bred to Bear

We grow them from the best individual types. Four hundred and twenty acres of this kind of stock is planted in our fruit orchards at Palisade, Colorado, and Green River, Utah.

Orders for Two Years in Advance at \$50 per Hundred

Mr. Lord, of Emery County, Utah, after seeing our expert mark and score a variety for budding purposes, ordered us to book 100 trees of the variety for 1910. When told we could not tell price at that time, he said anything up to \$50 per 100.

Thoroughbred Trees Show in Vitality and Growth

Artesia, N. M., December 12, 1908. The Winfield Nursery Company, Winfield, Kansas:

Gentlemen—Enclosed you will find draft for \$607.30 for credit on account of W. P. Galloway. Also attached are sending you list of names of those who have paid amount of draft.

Mr. Galloway and your Company are to be commended for the fine stock that you are sending to this section, and I believe that you are establishing a cus-

tom that will be very profitable in the future for your Company.

Kindly credit Mr. Galloway with amount of draft and oblige,
Yours very truly,

John B. Enfield,
Cashier Bank of Artesia.

Hdyro, Okla., December 28, 1908. The Winfield Nursery, Winfield, Kansas: Gentlemen—Your Company delivered \$6,000 worth of nursery stock here about November 20, 1908. The stock arrived in excellent shape. Every order of any size was packed separate in a box, and when unpacked was in just as good condition as if it had just been dug up out of the soil.

I have talked personally to at least three-fourths of the people who purchased this stock and every one whom I talked to said it was the best stock and packed in the best shape of any nursery stock they have seen in Oklahoma.

Very truly yours,

Roy M. Felton,
Cashier Hydro State Bank.

Apples are scarce. This 100,000 will go quick. Write for catalogue and prices with list of wants today.

PEACH

Queen of the United States

Hottes Elberta

Only 10,000 of this famous world-winner left. Write for description of this peach. Orange Cling, Phillips Cling, Champion, Salway and other leading varieties all greatly improved in propagation.

Colton, Cal., December 30, 1908.

Gentlemen—Having placed a small order for some of your nursery stock with Mr. James Nelson, of Redlands, I would like a copy of your catalogue and guide for the care of trees. Should the stock I have ordered prove satisfactory I may become a good customer. I think Mr. Nelson has the finest one-year-old peach orchard from your stock in all this valley.

Yours truly,
P. O. Box 387. W. H. Gilmore.

PEAR

Our Bartlett Pears at one year are better than the average two-year. In stock 5 to 6 feet, 4 to 5 feet and 3 to 4 feet. Beurre d'Anjou, one-year, 5 to 6 feet and 3 to 4 feet. Write for full description of The Winfield Nursery Company's one-year-old pear, equal to two-year-old. Keiffer, Clapp's Favorite, Winter Bartlett and others.

CHERRY

The Home of the Cherry—Winfield, Kansas

We are the only large and successful growers of Mahaleb stock in the United States. We ship them to every state in the Union. All our cherries are grown on home-grown Mahaleb stocks and are far better rooted than the Eastern grown cherry.

Shade Trees in Almost Carload Lots Eight Carloads Last Year to Denver

Box Elder, Russian Mulberry, Soft Maple, Ash, Osage Hedge, Elm
Buy Winfield Nursery Stock, Boxed in Paper Lined Boxes, Freight Paid

THE WINFIELD NURSERY CO., (Incorporated) Winfield, Kansas

J. MONCRIEF, President

E. S. MONCRIEF, Vice President

R. I. LEMON, Secretary-Treasurer

WHEN WRITING ADVERTISERS MENTION BETTER FRUIT

WHOLESALE

RETAIL

THE DALLES NURSERIES

R. H. WEBER, *Proprietor*

THE DALLES, OREGON

Grower and Dealer in FRUIT,
SHADE AND ORNAMENTAL

TREES

GRAPE VINES & SMALL FRUITS
EVERGREENS, ROSES & SHRUBBERYREMEMBER—OUR TREES ARE GROWN STRICTLY
WITHOUT IRRIGATION

and free of sediment, are without risk or discomfort to the user, are uniform in composition and reliable in action.

The V1 Fluid is a winter and spring spray only, while the trees are dormant. It kills the eggs of insects and the spores of fungi, mosses and lichens with which it comes in contact. It removes loose bark, lichens and mosses from the trees of every description, leaving the trunks and branches clean and healthy. It does its work in fifteen minutes, and if rain follows after that interval, it can do no harm. V1 Fluid is applied only to dormant trees, before the buds begin to open. It must be diluted as directed and is applied in the usual form of a fine mist-like spray. It kills completely and not partially.

The V2 Fluid is for a summer spray only, when the trees are in bud and leaf. It kills instantly aphids, psylla and scale insects. Does not injure leaf or blossom. The diseases which attack forest trees readily yield to the effects of the fluids, as well as the dreaded Hop aphid.

All this is but a small part of the interesting data regarding this new discovery, and space to give the entire subject full justice is not obtainable in an article like this.

Our readers should write for the 36-page descriptive pamphlet of the fluid to William Cooper & Nephews, 177 Illinois Street, Chicago.

PORTLAND WHOLESALE NURSERY COMPANY

Room 10 Lambert-Sargeant Building
Corner East Alder
and Grand Avenue
PORTLAND, OREGON

A REPUTATION TO SUSTAIN

VINELAND NURSERIES COMPANY

PROPAGATORS OF

Reliable Nursery Stock

ALL STOCK BUDDED FROM BEARING TREES
FRUIT AND ORNAMENTAL

CLARKSTON, WASHINGTON

NUTS and FRUITS and FLOWERS



Are you seeking some especially rare plants or beautiful flower? If so write to us about it. Our stock includes almost everything in hardy plants and trees for garden and orchard. Rare Japanese Plants a specialty. Okanogan Nurseries OMAH, WASHINGTON

SEEDS The best that money can buy.

TREES Straight, clean and true to name.

PLANTS and roots of all description, ornamental and vegetable.

SPRAYS for winter and summer, put up in the most convenient form.

PUMPS The best barrel pump sold. See our "Empire King" before you buy.

PACIFIC SEED CO.

201 Front St. S.W. Cor. Taylor

Portland, Oregon

CATALOGUE FREE

WRITE US BEFORE YOU BUY



Our trees and plants have been increasingly popular through two generations because they have stood the most rigid quality tests. We have been compelled to increase our facilities every year because the strong and thrifty stock we supply has brought our customers back season after season with larger orders.

WE'RE BIG AND PROUD OF IT

Because our growth has been due to the merit of our product. We now have more than a thousand acres in cultivation, under the direct supervision of members of the firm, because from the time we had a few acres only we have made it our first aim to give every buyer full value for his money. And we sell the stuff right. Send today for our free catalogue.

It is a fine book—away ahead of the average nursery catalogue—with photographic illustrations, some in full colors, and practical descriptions. We want you to see this book before you order trees and plants for the spring—it will help you in buying, no matter what are your needs.

Our great specialty is Peaches, of which we have about 700,000 fine young trees. We have a full line of other fruits, however, and are very strong in Ornamentals, which have our increased attention. A member of our firm recently visited the great nursery districts of Europe and bought for us many selected lots of shrubs and plants, standard kinds and novelties.

Write for the Catalogue—it tells the whole story

J. G. HARRISON & SONS

Dept. 447 Berlin, Maryland

Hood River Nurseries

Have for the coming season a very complete line of

NURSERY STOCK

Newtown & Spitzenberg propagated from selected bearing trees. Make no mistake but start your orchard right. Plant generation trees. Hood River (Clark Seedling) strawberry plants in quantities to suit.

SEND FOR PRICES

Rawson & Stanton, Hood River, Oregon

Buy and Try

WHITE RIVER FLOUR

MAKES

WHITER, LIGHTER BREAD

"THE OLD RELIABLE"

Albany Nurseries

INCORPORATED

ALBANY, OREGON

LARGE STOCK, FIRST CLASS TREES

Place Your Orders Now

Catalogue Free

MORE SALESMEN WANTED

STRAWBERRY PLANTS*That pay to plant are the kind we grow*

We have for this season the largest acreage of plants we ever grew. We have had unusually favorable weather and never grew such a fine lot of strawberry plants. Our supply consists of at least ten million plants of all the leading varieties, both old and new. We have shipped a large number of plants the past two seasons to the Northwestern states that have always given satisfaction. We are prepared to fill orders for any amount. We also grow Raspberry, Blackberry, Dewberry and all other small fruit plants, the quality of which is unsurpassed. If you want plants now, write for prices, stating your wants. Our new catalog will be ready to mail about January 1. It is FREE; write for a copy now.

W. F. DIXON, Holton, Kansas**SOME NEW SPRAY LOGIC**

BY LEO ZABEL, OF HOOD RIVER, OREGON

EVER since spraying has been adopted makers of sprayers have been following each other in the same rut. Some ingenious farmer, tired of hand pumping, converted his power pumping plant into a spraying outfit and makers of sprayers have been imitating him ever since. The only difference in them is in the makes of pumps and the motive power. The system and the principle have remained the same. Most of them pump up hydraulic pressure, forcing the spray solution directly through pumps of various types. A few compress air to high pressure to force out the liquid. They recognized the expansive power of compressed air and all reciprocating pumps have air chambers. A few used dust blowers and a few used carbonic acid gas.

At first fifty to seventy-five pounds pressure was used to sprinkle on the solution with. Later on one hundred pounds was thought high pressure, and so on from one hundred and twenty-five to one hundred and fifty, and now to two hundred and over. Some are advocating two hundred and fifty to three hundred pounds pressure. What is the object of raising the pressure so high? Why, simply to get high velocity and a fine spray to the solution. It makes no difference what method is employed so long as results obtained are the same.

The spouting velocity of water under one hundred pounds pressure is 121 feet per second, two hundred pounds is 171 feet, one thousand pounds is 385 feet, and at three thousand pounds it reaches

GOOD TREES

The planter who sets in his orchard other trees than the best he can buy—is making a serious mistake.

A good tree at a fair price is cheaper than a poor tree or one of questionable worth as a gift.

Orchard land is too valuable to be encumbered with trees that will be a long time in bringing returns.

Our trees are grown on the Yakima Reservation, isolated from old orchards, being as a consequence, free from pest or disease, and, possessing a splendid root system, they make a rapid growth and come into early bearing.

*Agents everywhere**More wanted***Washington Nursery Company**

TOPPENISH, WASHINGTON

**Famous Hood River
CLARK'S SEEDLING
Strawberry Plants***Any Quantity, 100 to 100,000*

Price, \$1.00 per 100 by mail postpaid

Prices, \$3.50 per 1000 by express

Write for special prices on large orders. Plants are fine.

Order before supply is exhausted. *Grown on our own grounds***Davidson Fruit Company**

HOOD RIVER

OREGON

**Apple Seedlings
NUMBER FOUR***Two Fifty Per Thousand*

APPLE GRAFTS PIECE ROOTS

Order quick

FOREIGN FRUIT TREE STOCKS

*Cherry, Plum and Pear*CONCORD GRAPES—*One and Two Year*CHERRY TREES—*All Grades**A Large General Stock**Submit List for Prices***Shenandoah Nurseries**D. S. LAKE, *Proprietor*

SHENANDOAH, IOWA

Canning Outfits

Can your fruits and vegetables the same as large canning factories. Your investment will be small and profit large. The STAHL CANNING OUTFITS are the best and cheapest, made in all sizes, fully guaranteed. Thousands in use. We start you out with everything needed to make a complete canning factory on the farm.



Agents
Wanted

Catalogue describing Canners and telling how to market canned goods to the best advantage, sent free on request.

F. S. STAHL MANUFACTURING CO.
Box 304-B, QUINCY, ILL.

a velocity of 666 feet per second. These figures apply to a round, smooth, solid stream from a nozzle. The use of the patent nozzle tips, which break the liquid up into fine particles and spread it, reduce this velocity from one-third to nearly one-half.

Compressed air issuing from a nozzle attains from twenty to one hundred times the velocity of water at the same pressure, the ratio of difference varying with different pressures. Compressed air at ten pounds pressure issues from a nozzle at the velocity of 535 feet per second; at fifteen pounds, 635 feet, and at thirty pounds it is 656 feet per second, or nearly the same as water at three

thousand pounds pressure. That is one hundred times as great. That is the reason the atomizer is such an efficient little contrivance. By the use of compressed air at fifteen to thirty pounds pressure, using the atomizer principle, the spray is driven at a high velocity, equal to at least one thousand pounds hydraulic pressure. This does not seem reasonable, but by reference to tables on velocities of compressed air and water it will be seen that water at one thousand pounds pressure will leave the nozzle at a velocity of 385 feet per second and air at fifteen pounds attains a velocity of 635 feet per second. Steam attains a velocity more than twice that of air at the same pressure.

This difference was realized and the atomizer principle adopted for spraying trees by an engineer who was fortunate in owning an orchard in Hood River,

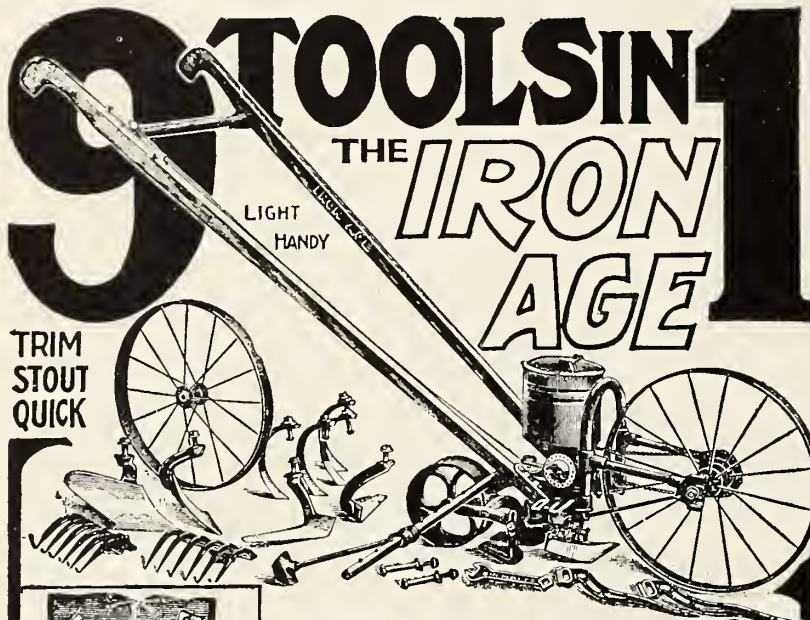
YUCCA PALM TREE PROTECTORS

Circulars and price list free on application
E. T. Folts, Hood River, Oregon

Stranahan & Clark

DEALERS IN

Commercial Fertilizers
Land Plaster, Lime
Plaster Paris, Cement
Building Plasters
Hood River, Oregon



TRIM
STOUT
QUICK

LIGHT
HANDY



You
can
see
the
Seeds
drop

GARDENING IS A DELIGHT

with this convenient tool, the No. 6 Combined Double and Single Wheel Hoe Hill and Drill Seeder. The cost is almost nothing. It seems almost unbelievable you can get so perfect an implement—the best ever devised—for so low a price.

STRONG AND CONVENIENT

Runs either single or double wheel for hoeing, raking, cultivating, plowing, hill seeding, drill seeding, etc. Simple to adjust. Nothing to get out of order. Arch is high enough to work astride of 20-inch plants. Simple handle adjustment, to suit height of small boy or tall man.

Greatest range of variety of seeds can be sown with IRON AGE drill. Distributes small packets with same uniformity as large quantity. Push agitator. Tool changes instantly from drill to hill or reverse. Drops seeds in hills 4, 6, 8, 12 or 24 inches apart.

SEED IS DROPPED IN FULL VIEW

You see the seed as it passes out of spout into furrow, so there can be no mistake about its actually being sown. Sowing instantly stopped by quick cut-off. There are more good points to the IRON AGE No. 6 than could be told of in a full page advertisement. IRON AGE tools are displayed by our agents. Illustrated descriptive material sent free on request. Write for it.

R.M. WADE & CO

Old Established IMPLEMENTS & VEHICLES Up to Date
PORTLAND, OREGON.

FOR SALE BY OVER 200 AGENCIES IN PACIFIC NORTHWEST

The entire IRON AGE line is sold by our agents. If there is no agency in your town write us

WRITE US for tip on how to put COLOR ON FRUIT and make it a LONG KEEPER

Certain Fertilizers with certain Soils—that is the secret—and we speak from

TWENTY YEARS' EXPERIENCE

with Pacific Northwest soils—experience that means dollars for the Fruit Grower

WE KEEP ALL

COMMERCIAL FERTILIZERS

POTASH Muriate

BONE MEAL BLOOD MEAL

TANKAGE

All our Analyses Guaranteed

SPRAY PUMPS FOR ORCHARDIST OR GARDENER

Spraying Materials for all Purposes and ALL SEASONS—ready to use at once, only needs diluting. We keep Scalecide, Lime & Sulphur Solution, Arsenate of Lead, Whale Oil Soap, Quassia Chips, etc., etc. JUST OUT—Write for our new No. 205 Catalogue.

PORTLAND SEED CO.

PORTLAND, OREGON
SPOKANE, WASH.



Oregon. He experimented for over a year with hand air pump and storage tank until an atomizer nozzle and a system suitable for tree spraying was perfected. He then built a power sprayer, using a steam-driven air compressor. This outfit is automatic in every way and so simple a ten-year-old boy could operate it.

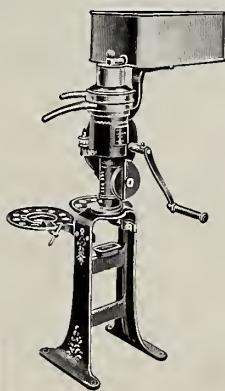
The atomizer sprayer will throw a fine spray at high velocity 25 feet at twenty-five pounds pressure and half that distance using a nozzle that spreads the spray. The spray can be regulated to any degree of fineness or coarseness desired with the same nozzle.

The main advantages of this new sprayer are that the spray solution does not come in contact with any of the working or moving parts and does away with the high hose-bursting pressure. The air is even used to agitate the liquid. The steam used for power can be used to heat the solution if desired. Being automatic not even a relief valve is used, which saves power, and only a simple little air pump is used that will last a lifetime, as it handles only pure air and there are no revolving bearings to oil or need attention. In every way this is the ideal and coming method for spraying. Patents are being procured.

The KURTZ Fruit Dryer

Simplest, cheapest and best dryer in use in Oregon, Washington and California. Tunnel system, best system on earth. We build by contract or furnish plans and patent rights and material, wire cloth, cast iron furnaces and furnace pipes. We also manufacture the Kurtz Prune Dipping and Spreading Machine. It has no equal; saves its cost in less than one season; capacity 200 to 250 trays per hour. Write for descriptive circulars and prices

CLINTON J. KURTZ
SALEM, OREGON



Simplex Separator

The Improved "Simplex" Separator should appeal to every intelligent and discriminating dairyman or farmer:

1. Because it is the most efficient and gets all of the fat that can be obtained from the milk by any process.
2. Because it is Self Balancing, and will not give trouble as other machines do.
3. Because it is the lightest running and can be operated by any member of the family.
4. Because it is the simplest machine, having the fewest parts.
5. Because it can skim cold or warm milk, and will not clog up.
6. Because it embodies all of the latest ideas and patented features that will keep it in the front rank for many years to come.

MONROE & CRISSELL

(SUCCESSORS TO MONROE & SHELTON)

Distributors of **The Simplex Line**

DAIRY, CREAMERY AND CHEESE FACTORY
MACHINERY AND SUPPLIES

143 FRONT STREET
PORTLAND, OREGON

THE FRUIT-GROWER

ST. JOSEPH, MISSOURI

3 BIG SPECIAL NUMBERS
January, - Spraying
February Gardening
March, Small Fruits **FREE**

The Fruit-Grower is the greatest and most helpful farm magazine. Each of these special issues contains about 70 pages, handsomely illustrated, cover in colors and weighs almost a pound. One issue is worth a dollar

if you have a few trees, plants or a garden but if you send 10c stamps or coin, to help pay cost of mailing and show you are interested and not writing through curiosity, the three numbers will be sent FREE. We cannot afford to send these papers unless you are interested. The paper is so good we know you will be a regular reader after you see these issues. Regular rate is a dollar a year, but as soon as you answer this "ad." we will send the first number by return mail and tell you how you can get the paper at half price and also secure

Absolutely FREE, Prepaid, a Tree and Vine of "Delicious" Apple and Banner Grape

These two new fruits, best ever introduced. Apple very finest quality in the world, sold as high as \$6 a box. Hardy everywhere. Fill in coupon below AT ONCE.

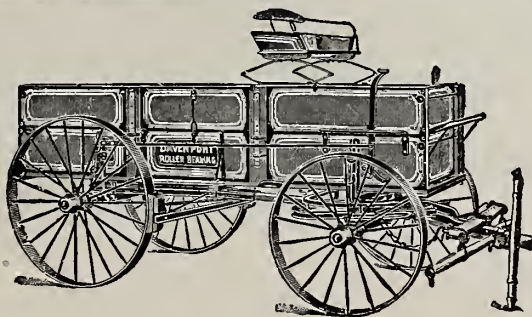
The Fruit-Grower, Box 545, St. Joseph, Mo.

I enclose 10 cents to pay cost of mailing three FREE special numbers. After receiving them I will either accept your Special Half Rate "New Fruits Offer" and subscribe or notify you to stop the paper.

Name _____

Town _____

State _____



Do You Know a Wagon Bargain When You See It?

You can pay a certain price and get an old style wooden wagon that you and your neighbors have always used. That will satisfy you as long as you don't know of anything better. But you can pay just about the same price, possibly a little more, and *see what you get for your money.*

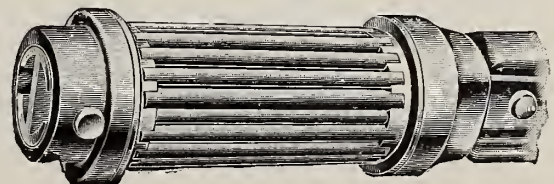
Buy this Davenport Wagon and you get a wagon that is practically all steel—a wagon that has double the strength and double the life of your wooden wagon. There are no break-downs, nothing to rot, dry apart or work loose. First cost is the only cost. There are no repair bills. You get the automobile hub with its perfectly protected steel roller bearings. Unlike your wooden wagon, it is impossible for sand, dust, mud or water to enter the bearings. You have the straight instead of the tapering spindle. You oil all four wheels in one-half minute. You do it without removing wheels. You get the wagon that is all convenience. You get easy running. You save your horses. Two horses pull as much as three with old style wagons.

This Roller Bearing makes 30 to 50 per cent lighter draft

Which is the better wagon bargain from you? Would you rather have the old style wooden wagon? Or would you rather pay the same price and get the long-lived, easy-running Davenport Roller Bearing Steel Wagon? Write for Catalog to give you particulars.

DAVENPORT WAGON CO.

Davenport, Iowa

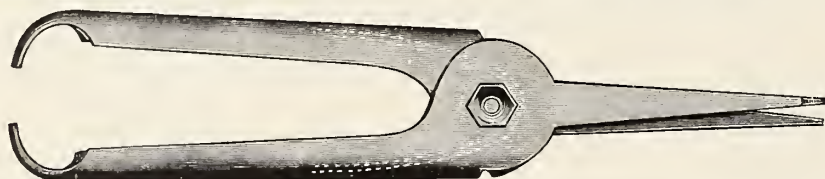


VARIOUS FORMS OF POWER USED FOR SPRAYING

ADDRESS BY W. B. PATTON, AT HORTICULTURAL MEETING, CASHMERE, WASHINGTON

OF the various forms of power used for mechanical purposes, but three can be considered practical for spraying, namely, the gasoline engine, steam and gas. Of these I consider the gasoline engine has more points in its favor than either of the others, and we will discuss it first. There are a number of makes that are good, but the fruit grower should study his own needs and get the engine that is best adapted; any of them will run a spray pump, but if you have other uses for power about the farm get one of the heavy water-cooled, low speed type, current furnished by magneto instead of battery, and you will have an engine

with long life; one that can be drawn on for more than its rated power if necessary; one that does not require much more mechanical ability to keep in order than a farm wagon. On the other hand, it is heavy, and in a spray rig we always have plenty of weight, especially if the orchard happens to be on a side hill or the ground very soft. For such an orchard one of the lighter air-cooled engines would be better adapted. There are several made weighing from fifty to one hundred pounds which will run a spray pump all right, but lack the lasting quality and reliability of the heavier machine.



A Box of Apples, 96 size, sells for \$3.00
A Box of Apples, 128 size, sells for \$2.00

Difference, \$1.00

A Gain of 50% By Using
Thinning Shears

This is the most practical pattern on the market today and used exclusively by Hood River Orchardists. Price 45c each, postpaid, or \$4.50 per doz., express collect.

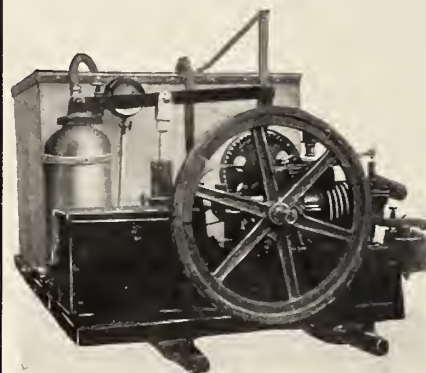
Franz Hardware Co.

Distributors Pacific Northwest

Hood River, Oregon

Place your orders early

The Sprayer that will do YOUR WORK



Pacific Power Sprayers

Weights 350 Lbs. Pressure up to 250 Lbs.
Adjustable for 2, 4 or 6 nozzles. Price \$150.

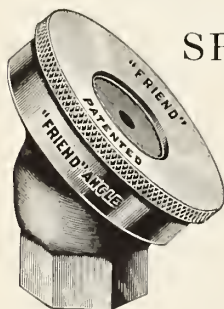
Interesting literature fully describing this wonderful little machine will be mailed on request.

Send for it today

Reierson Machinery Co.
182 Morrison Street, Portland, Oregon

"Friends" that Make Friends

SPRAYING NOZZLES

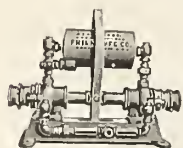


"Friend" Angle



"Friend" Regular

Positively our own idea. Any others like them are infringements. The original large spray nozzles, doing away with the cluster. The only ones with the maker's name and the word "PATENTED" stamped upon them. No horns, no hooks, nothing to catch, drip or clog. Makes the finest mist-like spray. Drives the spray farther into the trees than the cluster. The Angle sprays up under the leaves and down into the calyx. The Regular is for ordinary work. State which is wanted. Satisfaction guaranteed. Price \$1.00 each



The Improved "FRIEND" Large Size Hand Pump. A real power outfit. One man can pump it to 150 pounds, supplying two "Friend" Nozzles. Two men can pump 250 pounds or more, supplying two "Friend" Nozzles. A pump that will last a lifetime. Guaranteed to give entire satisfaction. Has a thousand advantages over others. Price \$25.00

Made by the **Friend Mfg. Co.** GASPORT N. Y.

who have sold, to date, March 8, 1909, 132 of their 1909 MODEL POWER OUTFITS

Compressed Air Atomizer Sprayer

Uses air compressor and no pumps. Liquid does not come in contact with any working parts.



Works on Atomizer Principle. Spray has higher velocity than old way. Simple, noiseless and automatic in operation, and no vibration. The coming method. Patents pending.

Compressed Air Atomizer Sprayer Co.

LEO. ZABEL, Manager

HOOD RIVER, OREGON

with the mechanical agitator and at the same time keeping the mixture warm, which is an advantage I think, especially with the lime-sulphur spray. Its disadvantages are time lost in getting up steam, part of one man's time is required to tend the fire, and it cannot be put to other uses for power, the machine being simply a boiler and a steam pump, with no rotating parts whatever.

The gas sprayer in some respects is an ideal machine, being light, simple and easily operated. It is simply a pressure tank built to withstand two-hundred pounds pressure or more, in which the solution is placed, the hose lines leading from the bottom. The power is gas under heavy pressure in steel cylinders which connect with the top of the tank, the pressure being regulated by an automatic valve. These gas cylinders are similar to those used with soda water fountains, which can be purchased ready charged and returned when empty. The experience in the Wenatchee Valley seems to have been that although these sprayers did perfect work the cost of gas was prohibitive.

Now, taking everything into consideration, there is no doubt in my mind that the gas engine is by far the best form of power for spraying, but I would cut out the pump as generally used to force the solution up against an air cushion, in the air chamber of the pump, by reversing the process and force the air cushion down on the solution, thus obtaining the same results with better efficiency and satisfaction. Remember, it makes no difference whether the liquid is forced into an air tank or the air into a tank containing the liquid,

but in this way we do away with pump valves and pistons working in strong solutions, which quickly eat and corrode them, necessitating frequent packing and renewal, by substituting a light, cheap air pump or compressor, run by engine and forcing air into the top of

tank under 150 to 200 pounds pressure, exactly as the gas tank supplied pressure in the gas sprayer.

In the old way, when the nozzles were shut off some means had to be adopted to relieve the pressure, generally accomplished by a spring weighted

The Original Sprayer

FAIRBANKS, MORSE & CO. were the first on the coast to foresee the necessity of Spraying—first in 1895—first in

1909. The Fairbanks-Morse Sprayer consists of the famous Fairbanks-

Morse Vertical Evaporator Type Gasoline

Engine to which is direct connected a 2 1/2 x

5 Fairbanks-Morse Double Acting "Mist"

Spray Pump, which gives a

working pres-

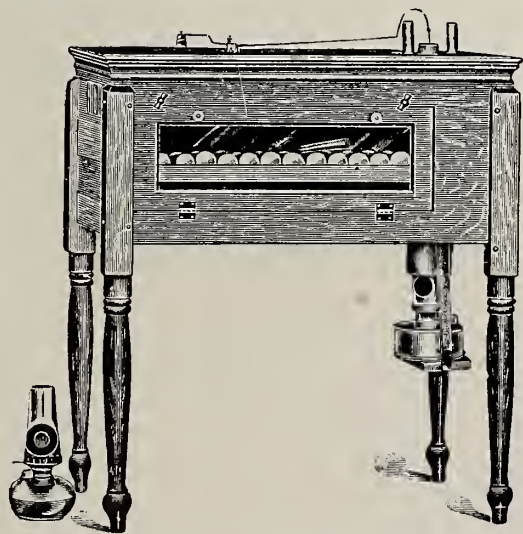
sure of 200 lbs., sufficient to force the spraying mixture into the smallest recess, in which insects might lodge.

We furnish Portable Spraying Outfits as per the cut; skidded outfits with engine, pump, tank, agitator, etc., or the bare engine and pump ready for you to mount. All information gladly furnished. We can please you. All outfits ready for immediate shipment. Send for free catalogs and prices.

FAIRBANKS, MORSE & CO. First and Stark Streets
Portland, Oregon



Get my Poultry Book, especially if you are a beginner you need my free poultry guide



DON'T experiment, get an incubator that has stood the test of the Coast climate. No other incubator has proved as satisfactory as the "Chatham." Over 5000 now in use here on the Coast. You can get one on 84 days free trial. Write for my book "Hints to Beginners," "Why Women Succeed," Etc. A postal will do.

GEO. W. FOOTT
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FRUIT BOXES

WE ARE EXTENSIVE MANUFACTURERS OF

Five Pound Tin Top Baskets

Common Quart Hallocks

Plant Bands

Shipping Crates

Apple, Pear, Peach and Picking
BOXES

OREGON AGENTS FOR THE

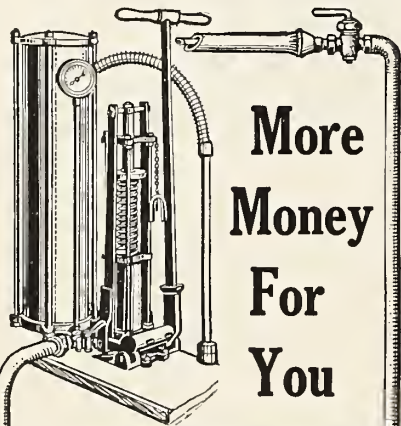
Hoquiam Patent Folding
Berry Hallocks

WE SOLICIT YOUR INQUIRIES

Multnomah Lumber and Box Co.
Foot Bancroft Avenue PORTLAND, Oregon

valve, which would lift at a certain pressure and allow the liquid to flow back into the tank, the engine doing the same work and using the same amount of fuel when the nozzles were shut in moving from tree to tree as when spraying.

In the new way a lighter power could be used, as the engine and air pump would be at work all of the time, and when not spraying would be storing power for the next tree. However, at present this is just my idea. I have not as yet had a chance to demonstrate it, nor do I know of it having been tried, but we know that the gas sprayer is a success with the exception of the cost of gas. Now, as the air around us is gas, or a combination of gases, and is easily compressed and made available, it is practically certain that such a machine would be a success and a great improvement on the old method.



**More
Money
For
You**

Greater productiveness of trees—larger, cleaner, and finer fruit—more money. Isn't that fruit growers' reasoning? Nothing will contribute to this end more than effective spraying. And **Effective Spraying** can best be attained with

Bean Magic Spray Pumps

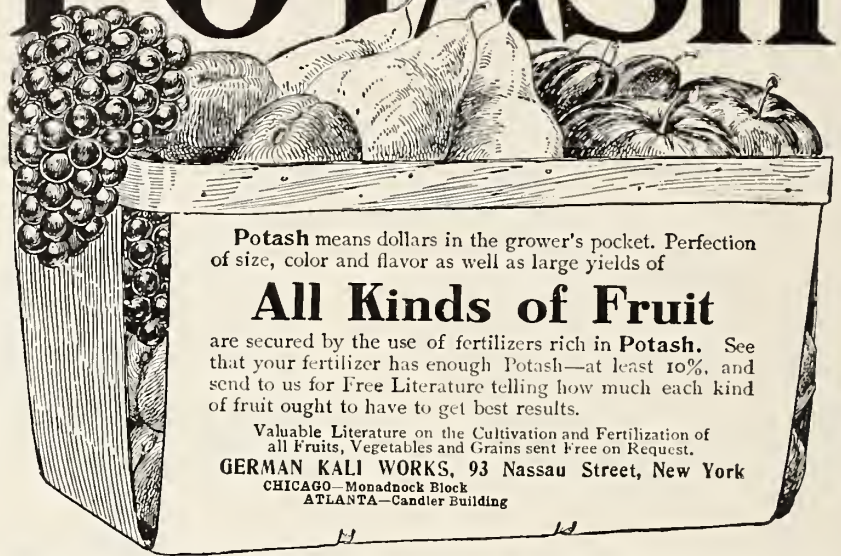
Effective spraying means **High Pressure Spraying** and till the advent of the Bean Magics a high pressure could not be maintained with a hand pump for any length of time, on account of the body-racking effort needed to operate it. The Bean patent spring divides the work between the two strokes of the handle and works against only one-half the pressure shown on the gauge and saves exactly one-third the labor.

Our illustrated catalog No. 21 describes ten sizes of hand pumps, and contains much valuable spray information, and formulas. Catalog No. 22 describes Power Sprayers. Both books sent free. Write for our special offer; state number of acres and kind of fruit.

BEAN SPRAY PUMP CO.

West Julian Street
San Jose, Cal.

POTASH



Potash means dollars in the grower's pocket. Perfection of size, color and flavor as well as large yields of

All Kinds of Fruit

are secured by the use of fertilizers rich in Potash. See that your fertilizer has enough Potash—at least 10%, and send to us for Free Literature telling how much each kind of fruit ought to have to get best results.

Valuable Literature on the Cultivation and Fertilization of all Fruits, Vegetables and Grains sent Free on Request.

GERMAN KALI WORKS, 93 Nassau Street, New York
CHICAGO—Monadnock Block
ATLANTA—Candler Building

Meyer Wilson & Co., San Francisco, California, are Sole Agents for the Pacific Coast

PREPARE FOR SPRAYING

ARE you prepared to do a good job of spraying?

You must spray if you would grow fruit successfully. You must spray not just once, but a number of times—spray not only this year, but next year and the following years. The warfare is a constant one.

So it pays to *get ready* for spraying. When you *do* spray you ought to be prepared to do the job right.

The I. H. Co. Gasoline Engines and Famous Spraying Outfits

afford the best of facilities for all sorts of spraying operations.

The power behind the pump is the basis of all right spraying. You can throw the spray mixture to the tops of tall trees and reach the ends of the long limbs with an I. H. Co. engine.

You not only have all the power you need but you have it dependably at all times. You do not need to keep your wagon or spray cart constantly in motion as in the case of wheel driven spray pumps, but you can let your wagon stand under the tree until you have sprayed every part of it thoroughly.

You have the choice of either purchasing one of the powerful, reliable I. H. Co. engines and connecting it up with whatever make of spray pump you prefer; or you can purchase one of the Famous spraying outfits, consisting of engine and pump, all connected up and mounted on skids, platform or 4-wheeled truck, ready for operation.

In either case, with an I. H. Co. engine furnishing the power you will be equipped for doing the work rapidly and in the best possible manner.

In the I. H. Co. line you will find many other very desirable engines and outfits, besides the Famous spraying outfits. There are general purpose engines for farm, shop and mill use. No matter what your requirements may be, you will find an engine in the I. H. Co. line to meet them. The line includes:

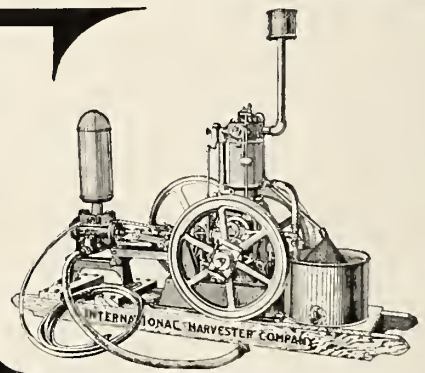
- I. H. Co. Vertical—2, 3 and 25-horse-power
- Horizontal (stationary and portable) 4, 6, 8, 10, 12, 15 and 20-horse-power
- Traction—12, 15 and 20-horse-power
- Famous Skidded Engines—2, 3, 4, 6 and 8-horse-power
- Air Cooled—1 and 2-horse-power
- Famous Mounting Engines from 4 to 20-horse-power
- Sawing and Pumping Outfits.

If you are interested, call on the International local dealer and get catalogs and full particulars, or address nearest branch house.

WESTERN BRANCH HOUSES: Denver, Col.; Helena, Mont.; Portland, Ore.; Spokane, Wash.; Salt Lake City, Utah; San Francisco, Cal.

INTERNATIONAL HARVESTER COMPANY OF AMERICA, CHICAGO, U. S. A.

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Profit by Experience!

Members of the Produce Reporter Co. are better equipped to do successful selling or consigning business than non-members

Organization is the keynote of success in this hustling day. Organization — national — of produce and fruit dealers is peculiarly necessary. It is an adaptation of the *local* idea. It is proportionately profitable. No shipper can afford to deprive himself of the co-operative service so easily to be obtained. Let the Managers tell you all about it.

PRODUCE REPORTER COMPANY

34 SOUTH CLARK STREET

CHICAGO, ILLINOIS

IS PONCE DE LEON'S DREAM A REALITY

So It Appears from Recent Investigations Made of

PASO ROBLES HOT SPRINGS, CALIFORNIA

HOPELESS CASES CURED LEAD TO COMMENT

In the days of Spain's splendor, when returning Spanish galleons brought precious cargoes of gold and other minerals back to Madrid, wild legends of springs of eternal life were told in every European court.

Ponce de Leon, a Spanish gentleman of great riches, fitted out an expedition and went in search of the spring of life. The ludicrous and pathetic ending of this expedition is known to every schoolboy, but it is very often called to mind by some new discovery of wonderful healing springs somewhere in the wilds of Africa, India or Asia.

The recent and practical demonstration of mineral springs which make marvelous cures has again brought forth the story abroad of Ponce de Leon's myth.

Paso Robles Hot Springs, California, are now the cause of universal wonderment, because of the continued successful cures being made there.

But aside from any romantic feature of the springs, dealing with its Indian tradition or its occupancy by the Franciscan monks, Paso Robles is today among medical men who know, the cause of much interest and scientific investigation.

Many are not aware of what a place Paso Robles really is. The town is by all means one of the most thorough health towns in the

world. It is given over to the cure of the sick. Its citizens regard its waters almost in an infallible light.

The temperature, altitude, air and scenery make of it an idealistic retreat. Its cures of rheumatism, gout, stomach trouble, kidney and other organic diseases, have been so remarkable that its citizens believe there is nothing its baths cannot conquer. They have passed generous health laws, permitting anyone to bathe in the municipal bath house except those who have tuberculosis or unclean ailments.

They do not stop at any expense in their endeavor after equipment, and the public bath house stands today one of the finest in America, either public or private.

Invalids from all over the country come to Paso Robles. Here can be seen every strata of human life, from the bank president in the sumptuous hotel to the sick man reposing in his tent on the meadows.

Paso Robles is distinctly a spot where weak women gain health rapidly, and an hour's conversation at the bath house will reveal tales of nervous women who have been cured.

One wonders, after being at Paso Robles (The Pass of the Oaks), whether Ponce de Leon really was without justification when he started in search of the wonderful "waters of youth."

Call on or Address WM. McMURRAY, General Passenger Agent, Southern Pacific Co. (Lines in Oregon), Portland, Oregon, for Illustrated Booklet giving full information about PASO ROBLES HOT SPRINGS, or write to the manager, Paso Robles Hot Springs, Cal.

Yakima Valley

Washington

The Home of the Prize Red Apples

THE

Northern Pacific Railway

IS THE ONLY DIRECT ROUTE

All kinds of the best Fruits, Vegetables, Grains, Grasses and Hops are produced without failure. IT IS UP TO YOU to start in the right location, GET A HOME and be independent.

For descriptive printed matter and full information



Write to C. W. MOTT
General Emigration Agent
Northern Pacific Railway
ST. PAUL, MINN.

What
One Man
Has Done
Others
Can Do:



North Yakima, Wash.,
Feb. 15, 1909.

Mr. C. W. Mott,
G. E. A., N. P. Ry.,
St. Paul, Minn.

Dear Sir: - I own 20 acres; paid \$100 an acre for same in 1884. Could sell now for \$2,500 an acre. It is all in apples, peaches, pears and apricots. My average crop is \$7,000 for the apples; \$1,500 for the pears, and \$1,500 for the peaches and apricots. Have got \$1,200 off one acre of Rome Beauty apples.

Yours truly,

W. L. Wright

GRASSELLI'S ARSENATE OF LEAD

For the Destruction of the Codling Moth and All Leaf-Eating Insects, Use Grasselli's Arsenate of Lead



CODLING MOTH

Grasselli's Arsenate of Lead is manufactured only by The Grasselli Chemical Company, established 1839, - General Offices, Cleveland, Ohio. When applied, ordinary rains will not wash it off. It is not injurious if applied unskillfully or in too great quantities. Grasselli's Arsenate of Lead can be used successfully against all leaf-eating insects, including the Codling Moth, Canker Worm, Elm Leaf Beetle, Potato Bug, Gypsy and Brown-tail Moth, etc. Grasselli's Bordeaux Mixture—a preventive of all fungous diseases. Grasselli's Bordeaux-Lead Arsenate Mixture—an insecticide and fungicide combined in one effective article. Write for descriptive booklet giving information how and when to spray.

THE GRASSELLI CHEMICAL COMPANY

Main Office, CLEVELAND, OHIO.

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GOULDS SPRAYERS

PORTLAND SEED CO.

Western Agents

Recommendations of leading fruit men, experiment stations and our 20 years experience all coincide to make us endorse Goulds line of hand and power sprayers as better adapted to Pacific Coast needs than any other spraying apparatus.

Goulds "Admiral" Goulds "Monarch"

We know this to be a fact that in these two pumps nothing has been overlooked in their adaptability to maintain pressure as hand pumps — one man power sufficient for two leads of hose without too hard work. While we keep repairs for Goulds pumps, we have rarely been called upon to replace wornout parts.

We consider Goulds Goods all put up on honor

Ask the man who is using a Gould why he never buys another. He'll say a Gould won't wear out, and if he wanted any pump at all he would take another Gould. The Gould is the cheapest as it doesn't cost anything for repairs.

Ask the power spray men who have been spraying for years. Ask the man who sells pumps what the purchaser of the Gould pump says. All tell the same story — made right, work right, wear right. We see that they are sold right.

All sizes receive the same careful attention, same material, same workmanship, same finish.

*Poultry
Supplies*



*Bee
Supplies*

*Spraying
Material*

*Horticultural
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Sprays

WRITE
FOR
VALUABLE
FREE BOOKLET
"HOW TO SPRAY"
"WHEN TO SPRAY"

Cut this out and write to Portland Seed Company,
Spokane or Portland, for free postpaid
copy of "How to Spray"
"When to Spray"



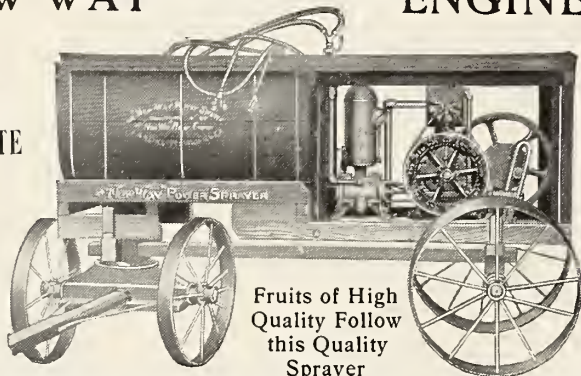
EASILY DETACHED
ALWAYS READY FOR ANY
WORK IN ANY CLIMATE



THE "New-Way" POWER SPRAYER

IS EQUIPPED WITH THE FAMOUS
"NEW WAY" AIR COOLED ENGINE

GASOLINE
DISTILLATE
OR
ALCOHOL
FUEL



Fruits of High
Quality Follow
this Quality
Sprayer

Carries high pressure without the usual vibration or strain, and is the most practical, durable and economical machine ever built for spraying. Use your own running gear if you prefer. Write us today for Spray Catalogue No. S-8



JOHN DEERE
PLOW CO.
PORTLAND, OREGON



Allen Fruit Caliper



Sizes fruit accurately, rapidly and enables the practical grower to put up the Commercial pack for the Fancy Trade. Live Agents wanted in every fruit district throughout the world.

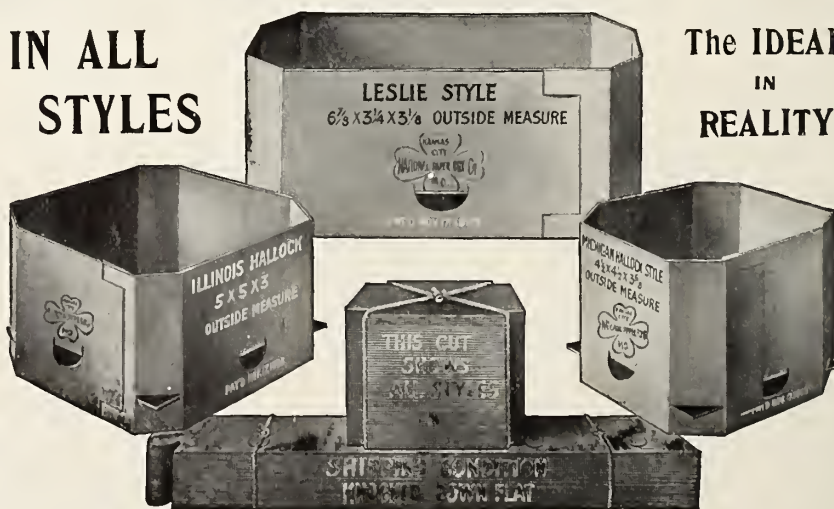
CORRESPONDENCE SOLICITED

ALLEN & ERFERT
MISSOULA, MONTANA

ANNOUNCEMENT!

We are pleased to announce to the trade that we have purchased the patents and business of the National Paper Berry Box Co., of Kansas City, Missouri, and have installed improved automatic machinery to manufacture same in quantities. We have overcome all imperfections of the box — it being sanitary, water proof and fruit preserving. Send ten cents for samples.

IN ALL
STYLES



The IDEAL
IN
REALITY

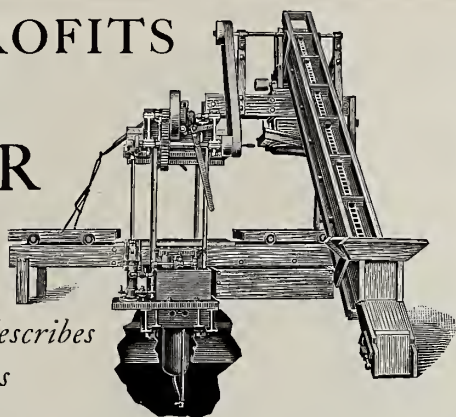
Patented Nov. 17, 1903.

PRICES QUOTED UPON APPLICATION

The National Fruit & Berry Box Co. TOLEDO, OHIO

BIG PROFITS IN CIDER

Write for
Catalog
which fully describes
and illustrates



THE ORIGINAL MT. GILEAD HYDRAULIC Cider and Wine Presses

Capacity, 10 to 400 barrels per day. Made in all sizes, hand or power

FULLY GUARANTEED

Write for any information desired. We can show you how \$1,500.00 clean profit can be made.

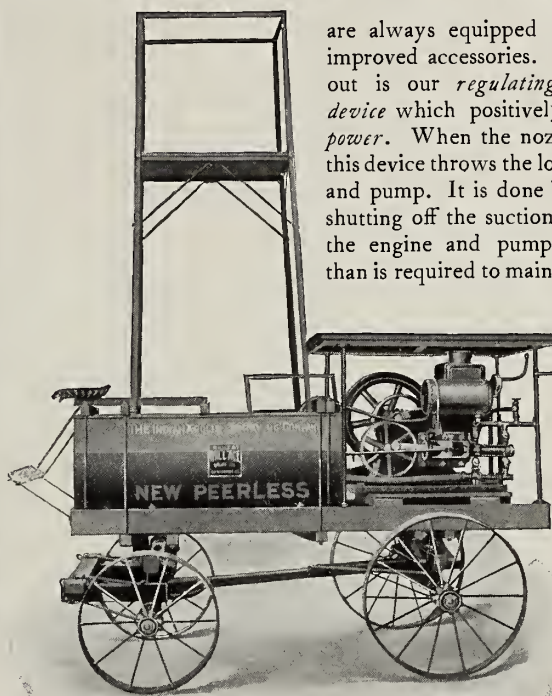
The Hydraulic Press Mfg. Co.

Largest Manufacturers of Cider Presses in the World

60 LINCOLN AVENUE

MT. GILEAD, OHIO

WALLACE POWER SPRAYERS



are always equipped with the most improved accessories. The latest thing out is our *regulating and unloading device* which positively *saves half the power*. When the nozzles are shut off this device throws the load off the engine and pump. It is done by automatically shutting off the suction. The load on the engine and pump is never more than is required to maintain the pressure on whatever number of nozzles are used. Consequently our machines work under the minimum load all the time, instead of under the maximum load as others do.

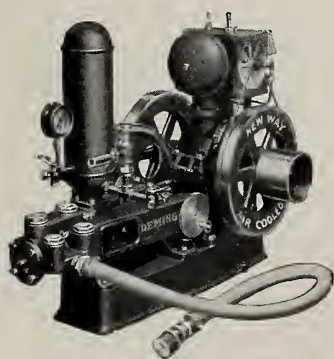
New Peerless Mounted

Our NEW PEERLESS SPRAYER shown above was the wonder of the National Apple Show, Spokane. It maintained a constant pressure of 200 to 220 lbs. with less than half the usual power. Better get informed about this. The device is applicable to all kinds of sprayers

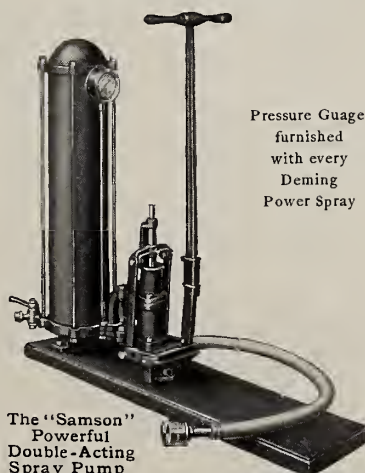
AMERICAN SPRAYER & SUPPLY CO.

Manufacturers Wallace Sprayers

CHAMPAIGN, ILLINOIS



Deming Premier Power Sprayer
2½ or 3½ H. P. Gasoline Engine
Light, Strong and Efficient



The "Samson"
Powerful
Double-Acting
Spray Pump

Pressure Gauge
furnished
with every
Deming
Power Spray

TO GET RID OF THESE *Use Deming Sprayers*



GOOD Spray pumps insure good fruit, but few pumps are *really good*. Too many manufacturers desire to turn them out for price alone—caring nothing about their work afterwards. Poor grades of brass are too often used, and very sparingly at that. Result—the user is out his purchase money and his pump, after a short service. All Deming Sprayers have either solid brass or heavy brass-lined working parts that insure years of usage. They are built for service—and they give it, as thousands of users will testify. Ask for our handsome 1909 Spray Pump Catalogue with 12-page spraying chart, giving remedies and directions about spraying. A copy of "Spraying for Profit," a valuable guide book on spraying, will be sent also on receipt of four cents in stamps to cover postage.



"Universal
Success"

Spray Pump and White-washer. Furnished with several attachments which make possible a number of varied uses. Best general purpose spray pump made.

THE DEMING COMPANY
755 DEPOT STREET = SALEM, OHIO
GENERAL AGENCIES IN ALL WESTERN CITIES

The Naylor Combination Spring and Spike Tooth Harrow

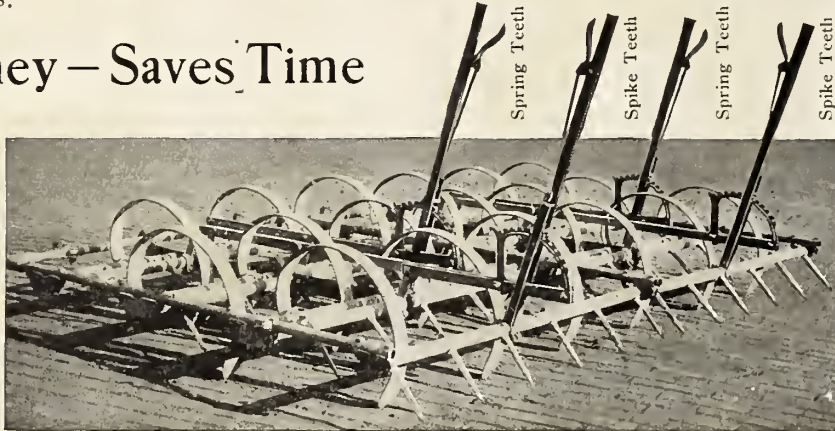
with the teeth in this most effective position cultivates and pulverizes the ground at one working. The Spike Teeth keep the Springs from burying and the hold of the Springs in the ground keeps the Spikes from skipping the clods.

Saves Money — Saves Time

Naylor Mfg. Co.

Gentlemen: To say I am well pleased with the 2-in-1 Harrow is putting it in a mild form. It is the most complete farm implement I ever used. You can refer them to me where they can see the Harrow and see it work.

Charlie Long,
Silverton, Oregon



Naylor Mfg. Co.

Gentlemen: Combined Harrow arrived and I have deferred writing you until had thoroughly tested it. Have tried it both on sod and stubble ground, and find it all you claim. To say am pleased with Harrow would be putting it too mild. Every one that has seen it work is highly pleased.

Yours truly,
W. R. Harding,

Naylor Manufacturing Company:

Gentlemen: It is certainly the best implement I ever used in the shape of a harrow. I would not try to farm without one if they cost twice the price.

Emmet, Idaho, January 25, 1908.

Yours truly,
G. A. WARDEN.

We GUARANTEE that you will be as well satisfied with the 2-in-1 Harrow, as are the satisfied users whose testimonials we publish.

J. A. FREEMAN & SON

PORTLAND, OREGON

General Agents for OREGON and WASHINGTON

WRITE FOR FOLDER

Ortho Arsenate of Lead

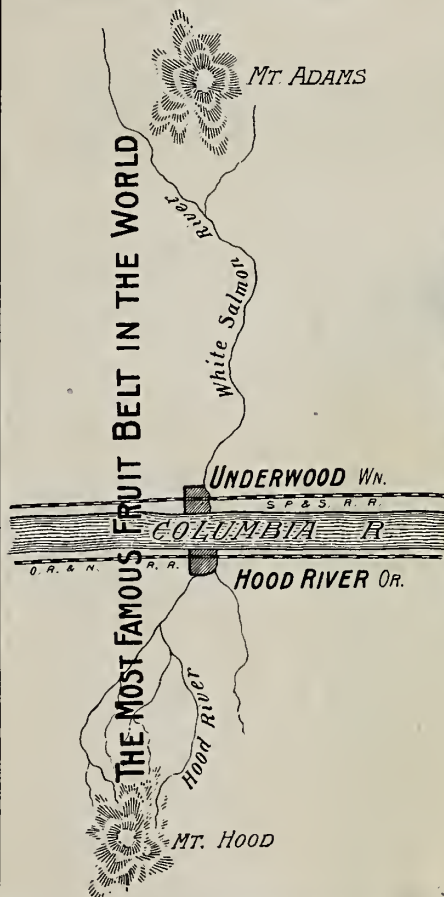
ABOUT four thousand cars of apples will be shipped from the Pajaro Valley, California, this year. These apples are kept free from worms by ORTHO ARSENATE OF LEAD exclusively. Ortho Arsenate of Lead controls the codling moth and absolutely will not burn your foliage. It is the result of the codling moth investigations of the University of California, and it is today manufactured by the experts who conducted these investigations. In two years Ortho supplanted all others, and was sold extensively in the Northwest last year under the brand of the Bean Spray Arsenate of Lead.

*The
Price
is
Right*

CALIFORNIA SPRAY-CHEMICAL CO.

BEAN SPRAY PUMP Co., San Jose, Sales Agent

Watsonville



UNDERWOOD

The Gateway to the White Salmon Valley



WHITE SALMON VALLEY FRUIT GROWERS' UNION OF UNDERWOOD, WASHINGTON.
Won three important premiums at Spokane—First on Best Four-Tier Newtowns, Second on Best Ten Boxes Newtowns, First on Best Pack.

Twenty minutes from Hood River by ferry. Two hours by rail, seven hours by boat from Portland. Twenty-five thousand acres first-class fruit land tributary to this point. Has a strong Apple Growers' Union, which controls output of the valley. Same fruit, same markets, same prices as Hood River has. Fine class of people coming in—a community of homes. Land close in to river and railroad, \$40.00 to \$150.00 an acre now, but advancing rapidly.

Write, phone or call on

W. F. CASH UNDERWOOD
WASHINGTON

APPLE LAND JUST PUT ON THE MARKET

Write to or call on Frank Davenport, Hood River, Oregon

If you want to buy good apple land in Hood River County, not over six miles from the City of Hood River, West. I have 1800 acres to sell cheap in lots and prices as follows:

160 Acres at \$35.00 per Acre

160 Acres at \$30.00 per Acre

160 Acres at \$25.00 per Acre

480 Acres at \$20.00 per Acre

320 Acres at \$15.00 per Acre

520 Acres at \$10.00 per Acre

This land has water on every 160 acres, and land joining this on the east can not be bought for less than \$225 per acre. Will not sell this land in lots of less than 160 acres.

Terms: Half cash, balance long time at six per cent

A Revolution in Spraying



SCIENTIFIC SUBSTITUTE
FOR ALL CRUDE REMEDIES

Every Grower should become acquainted with them

Write for Booklet of American, Canadian and British Testimony and Prices to

Local Agent — D. McDONALD, Hood River, Oregon

General Agent — C. G. ROBERTS, 247 Ash Street, Portland, Oregon

or Sole Manufacturers

WM. COOPER & NEPHEWS

717 Illinois Street, Chicago

An Unparalleled Achievement

Production Cost

The Production Cost items, each spraying, per acre, were as follows:

Material\$0.37 per acre

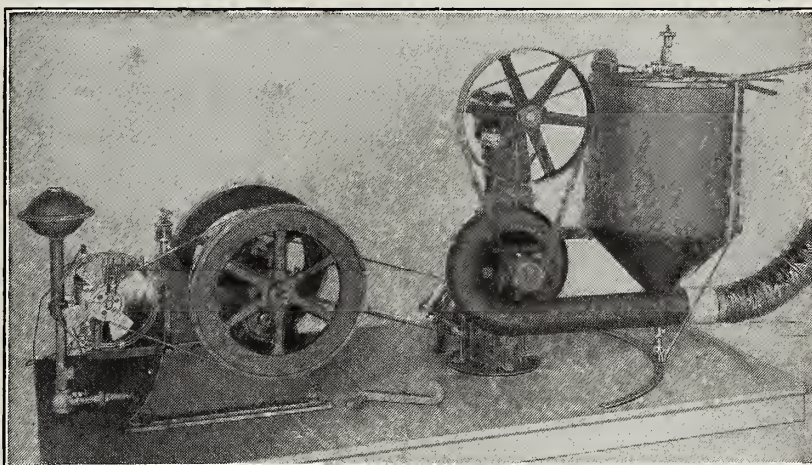
Labor, including team and
two men15 per acre

Gasoline01 per acre

Total cost, each spraying \$0.53 per acre
8

Total cost, 8 sprayings.. \$4.24 per acre

Total Production Cost, per tree, for
the season, 6 cents.



CAPACITY OF THIS APPLIANCE, 60 ACRES PER DAY. ITS GROSS WORKING WEIGHT, 1,000 POUNDS

BOARD OF HEALTH
DEPARTMENT OF FOOD INSPECTION

FRANK J. HALL, M.D. CHIEF INSPECTOR.

KANSAS CITY, MO.

Dec. 7, 1908.

Mr. G. C. Johnson,

812 Glen Airy Place, City.

Dear Sir:-

As a lover of fine fruit, incidentally as the general inspector of pure food for the City, I have pleasure in saying a word about the apples that you have been putting on the Kansas City market from your farm in Kansas.

Without exception they are the best that have been offered during the present season, and far outrank in quality, freedom from disease, such as scab, curculio, fungus, and weather-blight, of any that have come within my observation during the present year.

I have never seen your orchard, but I am confident that great care and attention must have been given by you in cleaning and ridding it of the micro-pests of the average orchard. Neither am I familiar with your methods of cleansing your trees, but taking your fruit as evidence, they must be very effective.

The ordinary price of Jonathan and Winesap Apples, the general product of this district, ranges from \$3 to \$4 per bbl.

It must be extremely gratifying to you to know that because of your care and attention to your trees, that your apples readily find a market at from \$6 to \$7 per bbl.

With wishes, constantly, for your success, I am,

Very truly yours,

Edward J. Wilson
Chief Pure Food Inspector

Quality

To produce quality, the appliance must be of light weight, easily and cheaply operated under any kind of weather conditions the grower may have to meet. To control disease in your orchard or in your family, you must use the known remedies. If the weight of your orchard appliance prevents you from doing this under all weather conditions, to know that you have a high priced, high pressure pump you cannot use is poor consolation, and the results will show your error in selecting an orchard appliance has been costly.

We used the Ideal, mounted as in the cut (Mr. Todd of Missouri says it is well named), to protect our crop last season. In April, May and June we had 37 wet days, and over 17 inches of rainfall. To outclass and outsell all fruit in the same class as our own, on a world's open market, during the season, from anywhere and everywhere, shows that we have reduced our orchard protection to a system that is dependable and certain. The achievement is of world-wide significance to fruit and vegetable growers everywhere.

QUANTITY—Is secured by preventing the fruit from dropping, and the wastes from blights and rots.

Our product, all kinds, on an average, ran over 95 per cent clean, salable fruit. We did not lose one bushel of fruit, all told, in our entire orchard from premature dropping.

Depending on the use of the remedies, bluestone and sulphur, in soluble form: Their action unrestricted from any cause whatever; their easy and quick application under bad weather conditions, and withal at low cost of production, are the elements that assured our success.

OUR APPLIANCES—We have a full line of hand and power machines suited to the small grower or the commercial orchardist. Our catalogue will tell you of these. Form 119 is full of practical information you need. On request we will send it to you and answer any inquiries by personal letter. This form tells the why and the how of the system we use. Our address is Kansas City, Missouri. Please keep it in mind. For personal attention, address as follows:

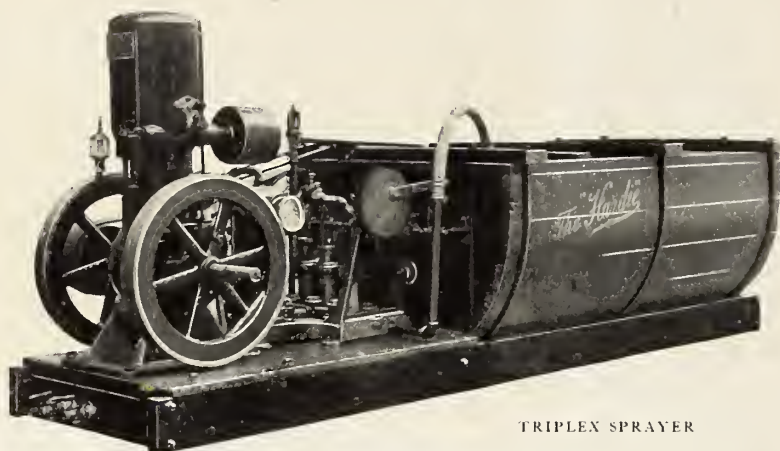
G. C. JOHNSON, President

DUST SPRAYER
MFG. Co.

KANSAS CITY, MISSOURI

THE ADVANTAGES OF USING *The Hardie Triplex Sprayer*

Nothing
to Watch but
the Spray



The Sprayers
with the
trouble *left out*

TRIPLEX SPRAYER

Anyone desiring a power sprayer should see the Hardie Triplex before purchasing. Ten years manufacturing experience are back of this sprayer, and its mechanical merits are so plain that the most thorough investigation can but make you like it better. A partial list of the direct advantages to you are given below:

Simple construction.
Light weight.
Strongly built to last for years.
Capacity up to ten gallons of liquid per minute.
Pressure regulated as desired to 225 pounds.
All valves are hard bronze balls.

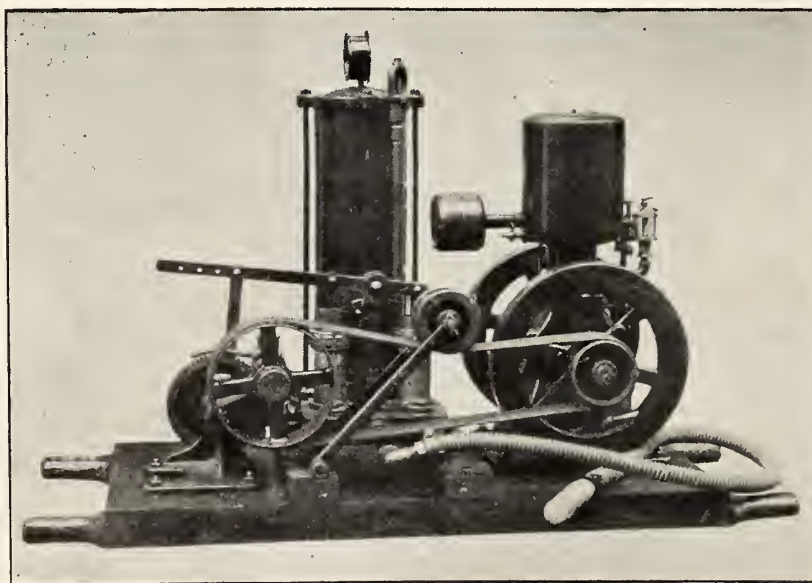
All plungers outside packed.
Use of engine for other purposes.
Change of speed of engine while running.
High quality of equipment.
Reasonable price.

Our catalogue tells about our whole line. It is yours if you write us.

This Simplex Sprayer will meet the demand of the small grower, or one whose orchard is on the side of a hill, together with the strawberry and hop growers. It consists of our 1½-horsepower engine and Simplex pump, mounted on a platform ready for work. Its total length is 4 feet, width 2½ feet.

It will supply four gallons of liquid per minute, and up to 200 lbs. pressure.

We sell you this sprayer and guar-



SIMPLEX SPRAYER

antee it for less than some ask you for an engine alone. This machine will work for less than your hired help. Have your engine for other work too. Better investigate this sprayer before buying.

The construction of the Hardie Sprayer is so very simple a child can run it; so strongly made that it will last for years, and so perfectly built that it is called "The Sprayer with the trouble left out."

THE HARDIE MFG. CO.

Hudson, Michigan

22 Front Street, Portland, Oregon

Much Depends Upon Quality

THE ALAMO

There is nothing more worthless than a cheap gas engine, and there are hundreds of such engines offered with every conceivable guarantee and recommendation, that will give the user nothing but *grief*, and will cause him to lose faith in his engine in particular and every gas engine in general.

There are also a few well-known makes which are honestly built but were designed more than ten years ago, and the design and pattern have not been changed up to the present time.

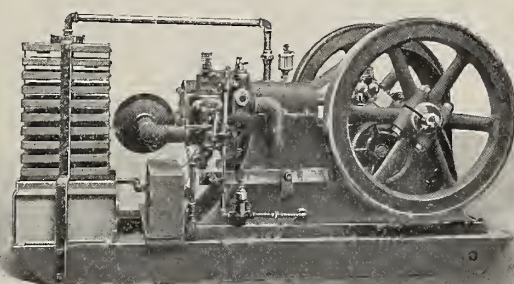


If you are figuring on installing gasoline power for any purpose whatsoever you cannot look too deeply into the *quality* of an engine that is suitable for your requirements.



Alamo Gas Engine

Easiest started, smoothest running, most durable, least fuel required



Some engines require a wizard or mechanical expert to get any work out of them. The Alamo is easily operated. Its mechanism is readily mastered, and any bright boy or man can run one. It is the most economical engine on the market, suitable for every kind of farm work. Sizes, one and one-half horsepower to fifty horsepower.



The tendency of this day and age is too much towards putting articles on the market that will sell readily on account of the cheap price together with a gaudy coat of paint or something that will make them look attractive on the outside.



There is as much difference between gas engine designs of ten years ago and the present time as there is between the old way of telegraphing over a wire and the new wireless system.

YOU WANT AN ENGINE UP TO THE MINUTE

in design, material and workmanship, and one which is twenty per cent more economical in fuel consumption than any engine offered. The one that *starts* easiest and which can be operated by a boy. One whose working parts are few and easy to get at, and an engine that will stand up to its work for years. We want to *prove* to you that the ALAMO is the engine you want if you desire the best, and the price is *right*. There are complete stocks well distributed throughout the entire Western Coast.

Send for our three color catalog descriptive of these engines. It is FREE

Beeman-Woodward Co.

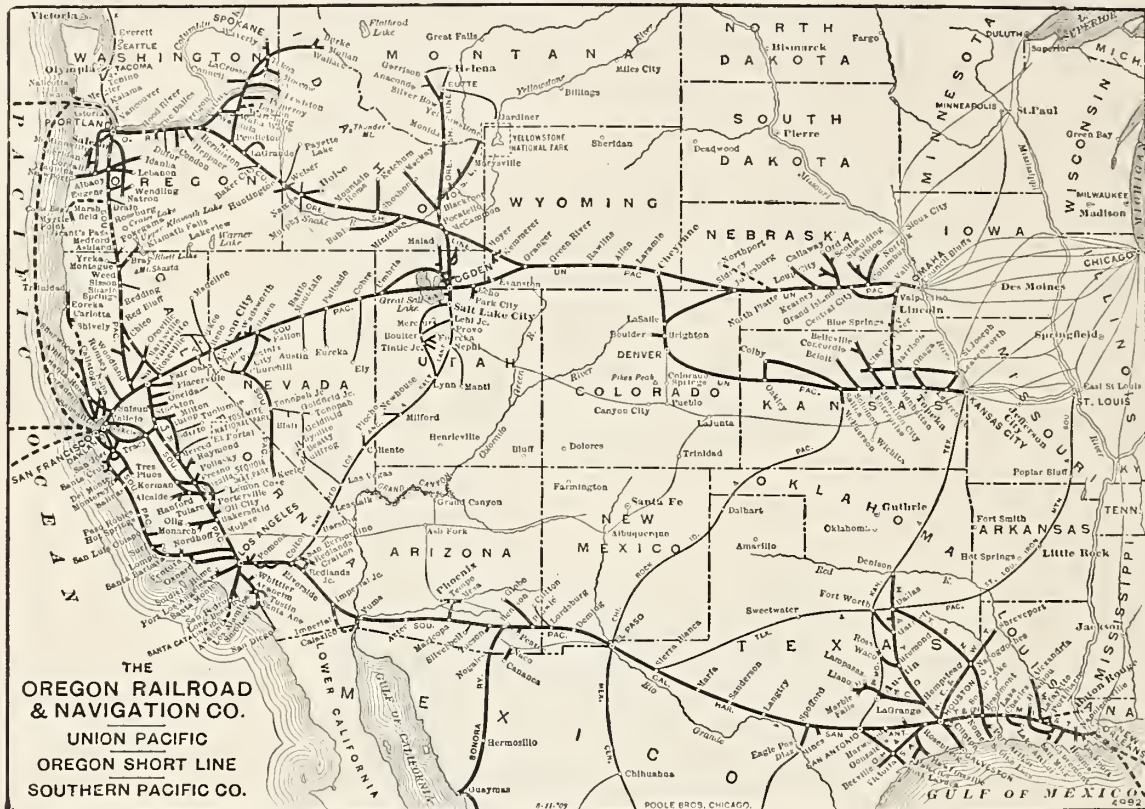
Western Distributors

71 FRONT STREET

PORTLAND, OREGON

The Main Highway Across Continent

Showing the direct route from the Middle West to the PACIFIC NORTHWEST



*Low Rate Colonist Tickets from the East to Oregon, Washington and Idaho
will be on sale during March and April*

From Kansas City . . .	\$25.00	From St. Louis . . .	\$30.50
From Omaha, Neb. . .	\$25.00	From Chicago . . .	\$33.00

With proportionate rates from other cities

THE OREGON RAILROAD & NAVIGATION CO. AND SOUTHERN PACIFIC CO. (Lines in Oregon)

In co-operation with the commercial organizations of the Pacific Northwest have issued a series of interesting pamphlets containing full, accurate and dependable information covering this attractive section.

The below representatives are supplied with this literature and will take pleasure in furnishing any advice desired:

New York.....	L. H. Nutting, General Eastern Pass. Agent, S. P. Co., 349 Broadway
Boston, Mass.....	J. B. DeFriest, General Eastern Agent, U. P. R. R., 287 Broadway
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	S. C. Milbourne, General Agent, 830 Chestnut St.
	R. J. Smith, Agent, S. P. Co., 632 Chestnut St.
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Tickets can be Prepaid by applying to any O. R. & N. or S. P. Agent

WM. McMURRAY, General Passenger Agent, PORTLAND, OREGON

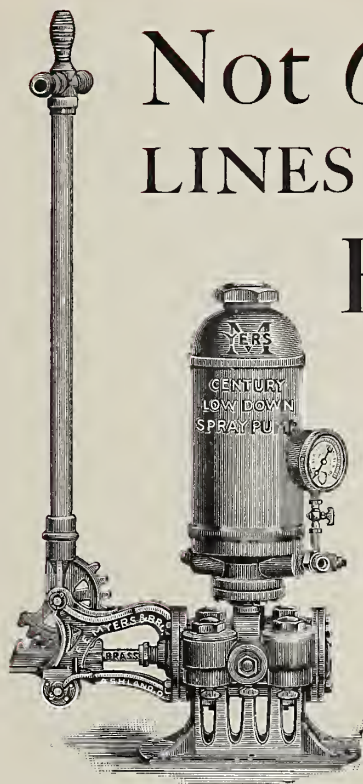


Figure 1274

MYERS CENTURY COG GEAR SPRAY PUMP

Increase the leverage at least 40 per cent. Poppet pattern brass valves, concave brass seats; each valve removed separately

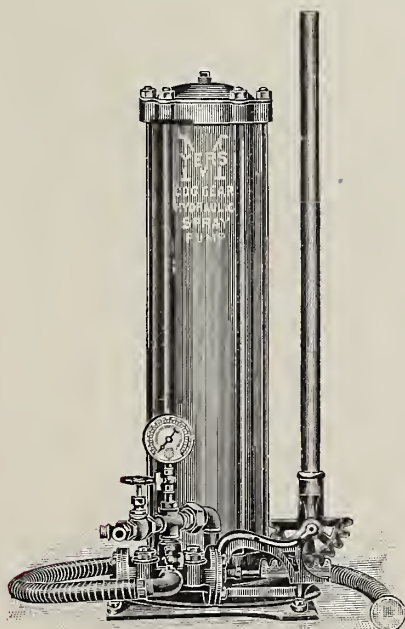


Figure 1229

MYERS COG GEAR HYDRAULIC SPRAY PUMP

Hemp packed brass piston. Air chamber 8 inches in diameter by 36 inches in height. Made for high pressure

Not *One* of the Best LINES OF SPRAY PUMPS But *THE* Best

You make no mistake when you purchase a **MYERS SPRAY PUMP**

The Myers line of Spray Pumps comprises the most complete line on the market, and we can truthfully say, and are ready to prove, that it has no equal. Unless you have used a Myers Pump you have not derived the full benefit of spraying, neither have you had the pleasure of using a pump that is easy to operate, that will enable you to spray in a more thorough manner, that is so fully guaranteed, that will not break down on the slightest provocation, that is not affected by caustic or hot or cold liquids, that will give the very best of service under all conditions. These pumps are used and endorsed by the leading orchardists and fruit inspectors of the Northwest; they have honestly earned these endorsements through the service they have given in the past. The 1908 Myers Pumps were miles ahead of all others, and the 1909 line is as far ahead of the 1908, being improved and strengthened in every conceivable way.

Don't fail to write for our free
Fruit Grower's Catalog

Shows our entire line of
Orchardist's Supplies

Mitchell
LEWIS & STAYER CO.

Portland, Oregon
Spokane, Washington
Boise, Idaho
Salem, Oregon
AGENTS EVERYWHERE

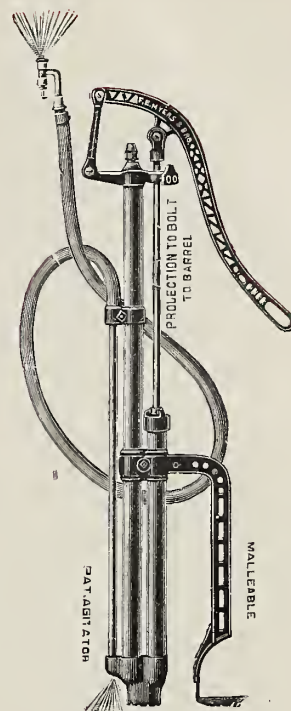


Figure 632

MYERS BRASS BUCKET SPRAY PUMP

Notice the lever and patent agitator

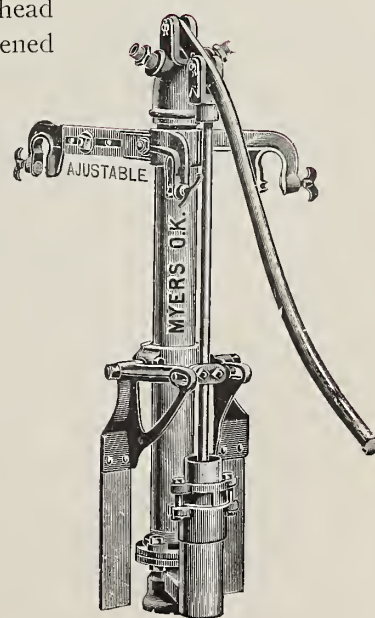


Figure 1125

MYERS O. K. BARREL SPRAY PUMP

For any kind of spray mixture. Valves can easily be taken out and repaired

HOOD RIVER

OREGON

Greatest Apple Growing Valley in the World



Spraying in a Bearing Orchard, Hood River Valley

Where fruit pays from \$500 to \$1500 per acre and is marketed for you at the highest prices paid anywhere in the world, while still on the tree. Forty thousand acres of finest apple land still undeveloped. One hundred thousand horsepower going to waste in its streams. Population, 6000; value fruit products, 1907, \$400,000; value lumber output, 1907, \$750,000; taxable property, \$2,700,000; bank deposits, 1901, \$36,000; 1907, \$690,494.31. Railroad and water transportation. Two hours from Portland, twelve hours from Seattle and Spokane. Rural mail delivery. Phone service covering city and valley. Let us tell you about it.

DO IT NOW—TO-DAY

ADDRESS

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